

Advances in medical science have contributed to increased life expectancy, decreased mortality and improved quality of life. Overall deaths due to natural causes dropped from 1,349 per 100,000 population in 1950 to 827 per 100,000 population in 1999.<sup>1</sup> In the early to mid 20<sup>th</sup> century, vaccines and antibiotics conquered many infectious diseases, dramatically reducing death rates for the young. More recently, drugs and new medical and surgical procedures have lowered mortality for heart disease and improved the quality of life for individuals with other chronic diseases, like diabetes and arthritis. Advances in imaging technologies now allow for earlier and more precise diagnosis of disease.

New technologies—medical devices, pharmaceuticals, biologicals, procedures, and capital equipment—however, have greatly contributed to our nation's rapidly rising health care costs. As premium growth for employers again hits double digits and federal and state governments face growing deficits, lawmakers and payers are wrestling with how to make innovative, quality-enhancing new technology available to those in need without creating incentives for excessive use.

As the largest payer in the U.S., Medicare significantly influences patient access to new technology through its coverage and payment policies. The advent of prospective payment systems has shifted more of the financial risk of technology adoption to hospitals. Legislation passed in the last few years provides for special payments for innovative drugs and devices, but the budget neutrality mandate means that new technology is funded by reducing payments for all other services. Budget neutrality provisions fail to account adequately for the cost-increasing effects of new technology adoption and use.

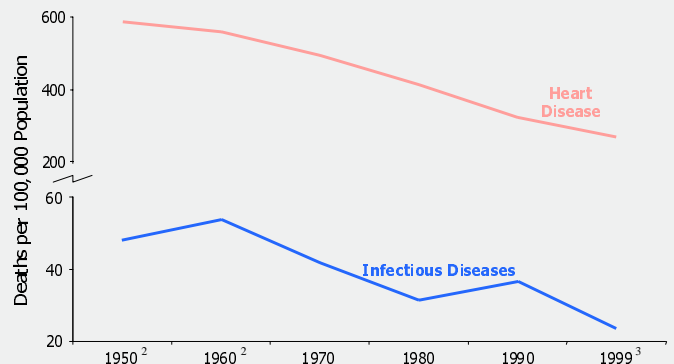
This edition of TrendWatch examines the benefits and costs of new technology and the challenges of establishing coverage and payment policies in an era of rapid technological advancement.

**“We have entered a new era in which it is more difficult to balance the possibilities of medicine and public expectations against the willingness to finance them.”**

— David Mechanic, Institute for Health, Health Care Policy and Aging Research, Rutgers University

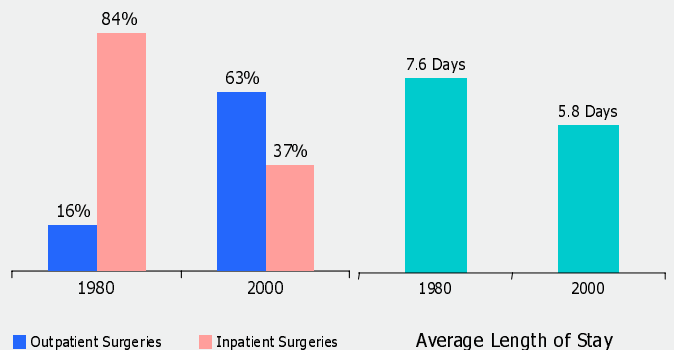
## Technological innovation has contributed to decreased mortality rates...

Chart 1: Mortality Rates for Infectious Diseases and Heart Disease, 1950-1999



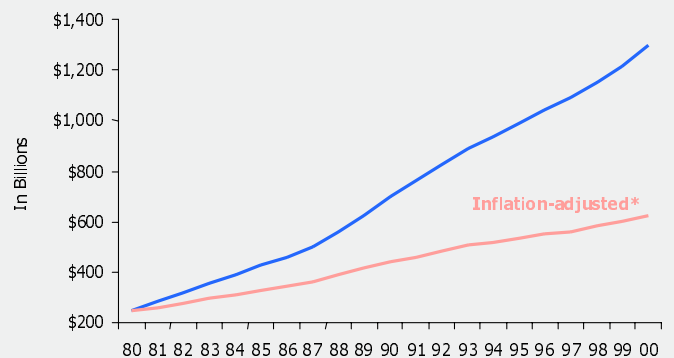
## ...and transformed health care delivery...

Chart 2: Percentage of Surgeries: Inpatient vs. Outpatient and Average Length of Stay in Community Hospitals, 1980 and 2000



## ...but also has contributed to rising health care expenditures.

Chart 3: Total National Health Expenditures, 1980-2000

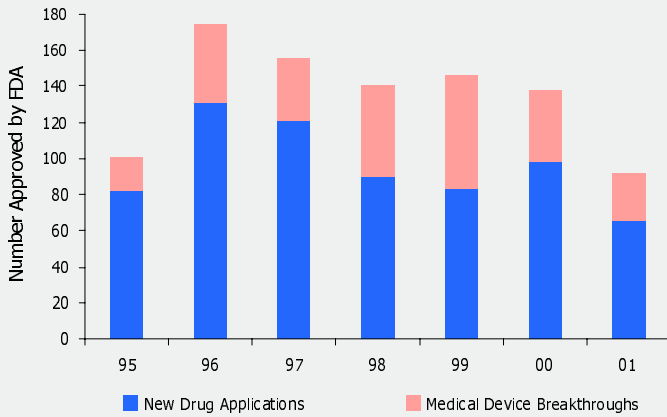


\*Expressed in 1980 dollars; adjusted using the overall Consumer Price Index for All Urban Consumers

# Technological Advances Improve Health and Change Health Care Delivery...

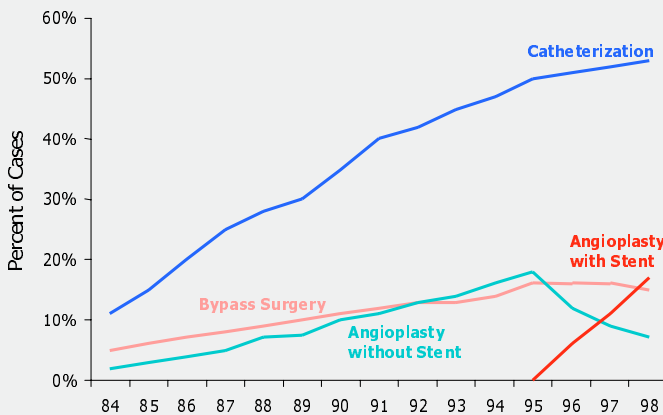
## The FDA has approved 947 new drugs and devices over the last seven years.

Chart 4: New Drug Application Approvals and Significant Medical Device Breakthroughs, 1995-2001



## Breakthrough technologies have transformed the treatment of heart attacks...

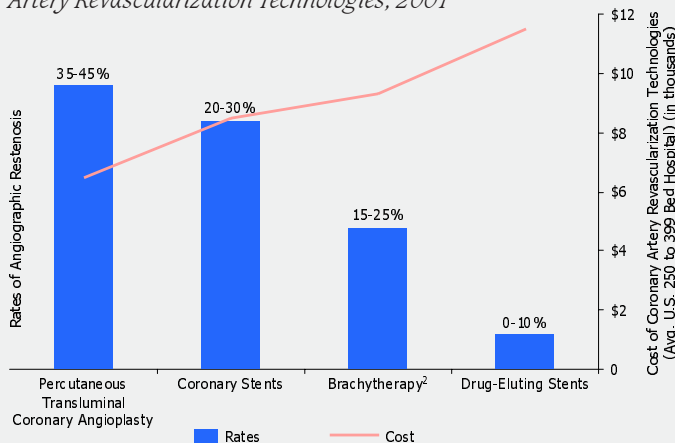
Chart 5: Changes in the Treatment of Heart Attacks\*, 1984-1998



\*Analysis of Medicare claims records for all elderly patients with a heart attack

## ...and, though costly, can markedly improve outcomes.

Chart 6: Decreasing Restenosis<sup>1</sup> of Minimally-Invasive Coronary Artery Revascularization Technologies, 2001



Multiple factors fuel the market for new technology, including advances in medical science and engineering, health needs of an aging population, third-party payment, provider competition, direct-to-consumer advertising, and public demand.

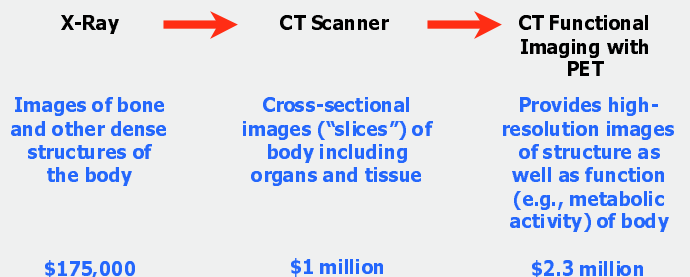
New technology not only can substitute for existing technology, it can extend the capacity of health care to prevent, detect, diagnose, and treat disease in ways that were previously not possible. New technologies can be targeted to a specific diagnosis or disease—such as implantable defibrillators—or have wide applicability across many diseases—such as MRI, PET, and other imaging modalities. In some cases, medical advances are required to keep pace with the evolution of disease. Emerging infections, such as HIV and West Nile virus, and the development of drug resistant forms of bacteria require continual innovation to detect and combat.

Technology can increase the efficiency and effectiveness of care. Minimally invasive surgical techniques (e.g., lithotripsy for kidney stones and arthroscopic knee surgery) have been instrumental in reducing lengths of stay and shifting care to the outpatient setting. These same techniques speed recovery for patients and benefit employers through less time lost from work.

Some new technologies are less expensive than the ones they replace, and many avert certain health care expenditures or other societal costs in the longer term; other new technologies add costs to the health care system. As the technological armamentarium expands, consumer expectations rise, demand goes up, and costs tend to increase.

## New diagnostic technologies allow for more targeted assessment and treatment but can significantly increase costs.

Chart 7: Evolution from X-ray to PET Scans



## ...But Can Have a Significant Impact on Costs

Technology can influence health care costs in a number of ways. The unit cost of a new technology can be relatively inexpensive, but it may have broad applicability. For example, ThinPrep® liquid-based cytology for cervical cancer screening increases the cost of a Pap Smear by only about \$8, but may have had as many as 12 million new users in 2001. Conversely, the unit cost of a new technology can be very high, but it may have limited applicability. For example, monoclonal antibodies add up to \$30,000 to treatment costs for selected cancer cases, but fewer than 30,000 people are likely to receive this treatment over the course of a year.<sup>1</sup>

A new technology may reduce the cost per service but lead to increased demand. For example, laparoscopic cholecystectomy (gallbladder removal using minimally invasive surgical techniques) reduced the cost per service by decreasing the average length of an inpatient stay from 7.5 days for open cholecystectomy to 2.6 days. However, as this innovation lowered the threshold for intervention, the number of patients who underwent elective surgery increased by 84.3 percent between 1990 and 1994, thereby increasing aggregate health care costs even though the unit costs of gallbladder removal decreased.<sup>2</sup>

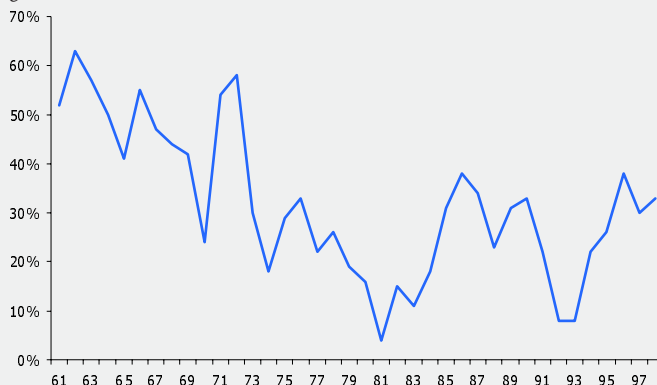
According to the Centers for Medicare and Medicaid Services (CMS), estimates of the contribution of technology to the total growth in health care spending vary from a low of 5 percent to a high of 60 percent depending on the year in question.<sup>3</sup> Estimates were at their lowest in the early 1980s and the early 1990s, coinciding with the implementation of the inpatient prospective payment system and the increase in HMO market share, which temporarily mitigated the influence of technology relative to inflation and other factors. Sharp increases followed, indicating that cost-containment measures are difficult to maintain over time.

### FDA Approval Process

The FDA is the most important gatekeeper of new technology in health care. There has been much criticism of the FDA's lengthy review process which, critics charge, slows the adoption of new technology and delays patient access to beneficial care. Hybrid technologies, like inhalable insulin therapy, combine elements of pharmaceuticals, medical devices, and/or biologicals, and, therefore, strain the traditional FDA structure of regulating these three technology types separately. The FDA regulatory review process has become more timely in recent years, due, in part, to Congress passing the FDA Modernization Act of 1997 (FDAMA).

### Technology has accounted for an estimated 5 to 60 percent of health care spending growth over time.

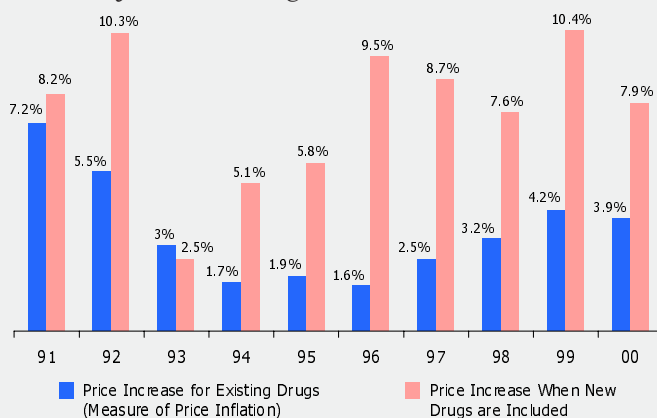
Chart 8: CMS Estimated Percent Contribution of Technology to Growth in Personal Health Care Spending — "Residual" Method of Calculation, 1961-1999



\*This method of calculation accounts for the impact of other determinants of spending (e.g., inflation, population changes) and interprets the "residual" as the effect of medical technology on health care spending.

### New technologies push up average costs...

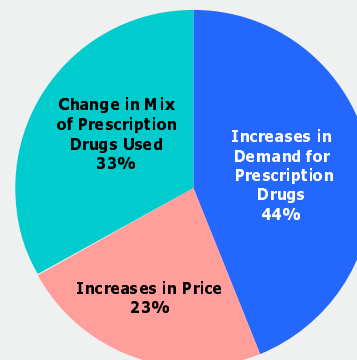
Chart 9: Price Increases for Existing Drugs vs. Price Increases When Newly Introduced Drugs are Included\*, 1991-2000



\*Price increases for existing drugs are manufacturer's prices. Price increases for new drugs are retail prices.

### ...and contribute to increased demand.

Chart 10: Relative Impact of Changes in Demand, Mix of Drugs Used, and Price on Rising Prescription Drug Expenditures, 1997-2000



# Payment Systems Have Trouble Keeping Pace with Advances in Technology

Once the Food and Drug Administration (FDA) approves a medical device or drug for market in the U.S., Medicare and private insurance companies decide whether to cover the new technology and how to pay for it. Though they rely as much as possible on scientific data to make coverage decisions, these decisions may be influenced by other considerations.

The case of high-dose chemotherapy with autologous bone marrow transplant for breast cancer illustrates the complexities inherent in coverage decisions. Under pressure from certain consumer groups, physicians, the media, legislators and even the courts, health plans decided to cover this treatment before large scale clinical studies had been done. In the 1990s, over 41,000 patients in the U.S. underwent this treatment at a cost of over \$3.4 billion. Recent large-scale randomized control trials have shown that this treatment offers no advantage over more traditional treatments for breast cancer.<sup>1</sup>

Health care providers, in turn, must determine which new technologies to offer their patients. In addition to pressure from physicians and hospital competition, hospitals must consider the impact of the new technology on productivity, safety and risk to patients, probable health outcomes, regulatory status, personnel and facility requirements, and finances in decision making. Determining the financial impact of a new service can be difficult because payment systems often lag the introduction of new technology. Often, hospitals will choose to provide a service despite financial uncertainties, if they judge it is in the best interest of patients.

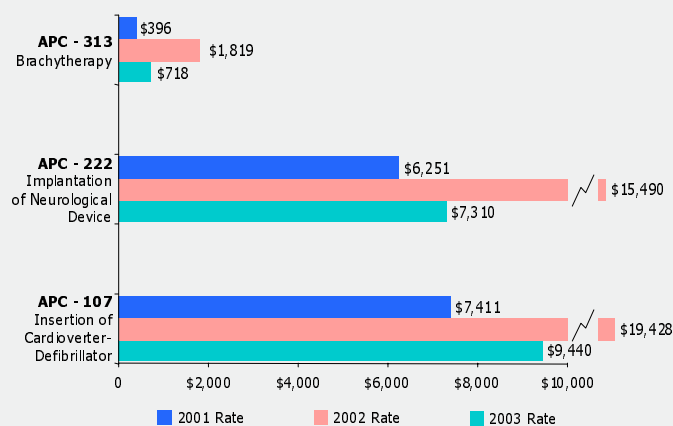
In the past, hospitals were paid on the basis of their costs or charges. Today, Medicare and many private

payers provide a single fixed payment for a defined set of services. For private payers, multi-year contracts often govern payment. Case-based, capitated, or per diem payment terms can leave health care providers at risk for the costs of expensive new technologies until payments are renegotiated, or in the case of Medicare, recalibrated, to account for the introduction of new technology. For example, when the American Red Cross introduced leukoreduction, a process that uses filtration to reduce leukocytes to trace amounts in donated blood, the cost of a pint of blood rose by 31 percent,<sup>2</sup> but payment for procedures requiring blood transfusion did not reflect this sudden increase in costs.

Traditionally, Medicare inpatient and outpatient prospective payment systems (IPPS & OPSS) do not reflect the costs of new technologies until two to three years after widespread adoption. The added costs of new technologies have in practice, not been paid for by Medicare, although payments across services get recalibrated when new cost data become available. To address the time lag, Congress passed provisions for special payments for certain new technologies. To accommodate these payments in a "budget-neutral" way, payments for all other services were reduced proportionately. While Congress intended these provisions to protect hospitals' ability to provide new and innovative devices and drugs to patients, they have proven extraordinarily complex and difficult to implement, and have resulted in large swings in service payments from year to year under OPSS. To the extent that hospital charges for outpatient services do not reflect costs, payments will not accurately represent hospital experience.

## Difficulty estimating new technology costs caused dramatic swings in APC rates...

Chart 11: Comparison of Payment Under Medicare OPSS for 2001, 2002 ("fold in") and Proposed 2003 (Incorporation into base rate)\*



\*Rates for 2001 and 2002 do not include special pass-through payments.

## ...even for APCs not involving new technology, as all payments were recalibrated.

Chart 12: Comparison of Payment Under Medicare OPSS for 2001, 2002 ("fold in") and Proposed 2003 (Incorporation into base rate)

