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# Physician Reimbursement for General Surgical Procedures in the Last Century: 1906–2006

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- BACKGROUND:** The last century has seen revolutionary changes in health-care delivery and treatment of surgical diseases. Equally dramatic has been the changes in health-care economics, including the creation of the Medicare and Medicaid programs in 1965. To better characterize the impact to surgical billing, we have undertaken an analysis of physician fees for common general surgical procedures during the past century.
- STUDY DESIGN:** Five common general surgical procedures were analyzed—inguinal herniorrhaphy, appendectomy, cholecystectomy, thyroidectomy, and repair of abdominal aortic aneurysm. Data for physician fees and reimbursement were obtained from the *Illinois Medical Blue Book*, the University of Iowa Department of Surgery, and the Centers for Medicare and Medicaid Services. The Consumer Price Index was used to convert all data to 2006 dollars.
- RESULTS:** Trends for billed charges of common surgical procedures during the last century have decreased by an average annual rate of approximately 3.5%. Reimbursement during the past 15 years demonstrates continued decreases for repair of abdominal aortic aneurysm (4.7%), thyroidectomy (3.3%), and cholecystectomy (2.9%), and reimbursement for inguinal herniorrhaphy has been flat and for appendectomy has increased slightly (0.9%). The combined annual decrease in reimbursement for the group of 5 surgical procedures during the past 15 years is 1.4%. By comparison, the average annual change in the price of an automobile during the past century has seen a 1.25% increase. Interestingly, milk prices have had a similar trend as surgical procedures with an average annual decline of 1.5% during the last 15 years, which has been attributed to government support (creating a surplus) and increased productivity.
- CONCLUSIONS:** There has been a substantial decline in payments for general surgical procedures during the past century. The influences of government regulations and increased productivity are likely to continue to apply downward pressure on surgical reimbursement. (*J Am Coll Surg* 2008;206:670–677. © 2008 by the American College of Surgeons)
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The last century has seen an unparalleled increase in economic prosperity. Although there have been some notable economic downturns, such as the Great Depression, real Gross Domestic Product (GDP) per capita in the US has increased by 680% from 1905 to 2005.<sup>1</sup> US short-term interest rates have varied from a low of 0.04% during World War II to a high of 14% in the early 1980s, with interest rates today comparable with rates from the early

part of the 20<sup>th</sup> century.<sup>2</sup> The US inflation rate has had wide variations during the last century, but the annualized inflation rate in the US for the period from 1906 to 2006 was 3.19%.<sup>3</sup> Changes in previous centuries were driven by revolutions in theory, religion, or military conquest; the driving force for change in the 20<sup>th</sup> century was largely related to technology. Technological advances, including improvements in transportation, communication, computation, and mechanization, have resulted in drastic increases in productivity and efficiency.

Health care has also undergone exceptional changes during the last 100 years. Medical science has seen many important milestones during the last century—the discovery of insulin in 1921, the introduction of penicillin in 1945, the creation of the heart-lung machine in 1953, the first kidney transplantation in 1954, the global eradication of small pox in 1980, the adoption of laparoscopic surgery in the 1990s, and the sequencing of the human genome in the

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### Abbreviations and Acronyms

CMS = Centers for Medicare and Medicaid Services  
CPI = Consumer Price Index  
GDP = Gross Domestic Product

first part of the 21<sup>st</sup> century. Profound changes in medical education, training, and policy began with publication of the Flexner Report in 1910.<sup>4</sup> The Flexner Report also had the effect of reducing the number of physicians and raising the income of the remaining practitioners.

Compared with other countries, the US has the highest rates of health-care expenditures measured by the percentage of GDP or by per capita spending on health care.<sup>5</sup> Health expenditures have increased during the last century, with a more rapid rate of expansion during the last few decades. Health-care spending as a percent of GDP has increased from 3% in 1906, to 5.1% in 1960, to 16% today.<sup>6</sup> The first modern group health-care insurance plan was introduced in 1929, and employee health benefit plans proliferated during the 1940s and 1950s.<sup>7</sup> Medicare and Medicaid programs were enacted in 1965, which had a dramatic influence on health-care financing. By the mid-1970s, the Centers for Medicare and Medicaid Services (CMS) were attempting to limit physician reimbursement by using the Medicare Economic Index, which tied increases in physician fees to costs for rent, utilities, and staff salaries.<sup>8,9</sup> In 1989, with the support of organizations such as the American Society for Internal Medicine, Congress created the Resource Based Relative Value Scale as a way to redirect physician reimbursement from traditionally “overvalued” surgical procedures to “undervalued” cognitive physician services.<sup>8,10</sup>

We were interested in characterizing the changes in reimbursement of surgical procedures during the last century. For this study, we chose to examine five common surgical procedures, including inguinal herniorrhaphy, cholecystectomy, appendectomy, thyroidectomy, and repair of abdominal aortic aneurysm. Although there have been improvements in safety and predictability and the recent introduction of “minimally invasive” approaches, many of the surgical procedures we have chosen to study are performed today in a manner quite similar to approaches used a century ago.

## METHODS

### Data collection

Data for physician fees and reimbursement for five common surgical procedures—appendectomy, cholecystectomy, total thyroidectomy, inguinal herniorrhaphy, and re-

pair of abdominal aortic aneurysm—were collected from a variety of sources. Early in the century, suggested fees were obtained from the *Illinois Medical Blue Book* and the Chicago Medical Society fee table for the years 1901 to 1952.<sup>11-15</sup> CMS provided data for the years 1991 to 2006. The most difficult period to obtain accurate, publicly available data proved to be the years from 1955 to 1990. Billing data from the University of Iowa Department of Surgery was used for selected years (1967 and 1978). We analyzed available data and compared trends during the past century with more recent trends in data obtained from CMS. As a comparison, we obtained data of two selected commodity products: cars and milk. Average car prices were obtained from the US Department of Transportation since 1990 and we obtained historical prices of popular car models from various historical documents before 1990.<sup>16,17</sup> We obtained the prices of milk per gallon from 1918 to 2006 from the US Department of Agriculture.<sup>18,19</sup> Historical prices for earlier years were obtained from various historical documents. We obtained the health-care spending data series from the National Center for Health Statistics.<sup>20,21</sup> Table 1 provides a brief summary of the data by decades.

### Statistical analysis

We used OLS regression to trend the data series. Prices were log transformed to calculate annual percentage change. Assuming the five chosen procedures were representative of all other surgical procedures, we combined the data for surgical procedures and computed the overall trend with a fixed-effect model. We interpreted the annual change computed as the average annual change for all five procedures.

The modeling fit of the regression analyses should be interpreted as a test of the existence of a trend, as indicated by the coefficients. Adjusted R<sup>2</sup> can be interpreted as how consistent the annual changes have been for the given period. All statistical analyses were conducted with STATA 9.2 software (Stata Corp).

## RESULTS

We obtained a photograph of a receipt for a bill from Dr Theodor Kocher dated July 5, 1910, “for operation on the neck of Miss Springer” in the amount of frs 1,500 (Fig. 1). The symbol (frs) before the amount indicates Swiss francs. Using an exchange rate for 1910, 5.2 francs per \$1, this amount would be \$288 and, based on the Consumer Price Index (CPI), converting to 2006 dollars is \$5,887. Kocher was probably the most notable surgeon of his day and a Noble Laureate. Although the details for this particular surgical procedure are not clear, this artifact sparked our interest in examining historic trends in surgical reimbursement. There is an impression that surgical reimbursement has seen a progressive decline,

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