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The Impact of Innovation on Patient Access:How Rising Costs Affect Availability of Imaging

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Health policymakers have focused on cost containment, for the past several decades, to deal with the rapid rise in healthcare costs in the western world. All kinds of measures have been introduced in all kinds of healthcare systems. Virtually all of them have one thing in common – they failed to achieve cost containment. When trying to explain failure, health policy experts point to the spread of medical technology.

The same innovations that save so many lives seem to be responsible for making our healthcare systems financially sick. The exact impact of new medical technology on long-term spending growth remains subject to some controversy. Most experts believe medical technology advances to account for one-half to two-thirds of annual spending increases. It is apparent that new medical technology is the dominant driver of increases in healthcare costs and hence insurance premiums.

Medical Technology & its Impact on Healthcare

The term “medical technology” refers to procedures, equipment and processes by which medical care is delivered. Hence medical technology innovations can relate to new medical and surgical procedures (e.g., angioplasty, joint replacements), the discovery of new drugs (e.g., biologic agents), the implementation of healthcare IT systems (e.g., electronic medical records and transmission of information, telemedicine), or the development of new medical devices.

How Does New Medical Technology Affect Healthcare Costs?

While some new technologies, e.g. vaccines, do result in lower short-term spending, research shows that, on balance, advances in medicine result in increased spending. Rettig* describes the mechanisms by which new medical technology affects healthcare costs:

• Development of new treatments for previously untreatable terminal conditions, including long-term maintenance therapy for treatment of such diseases as diabetes, end-stage renal disease, and AIDS;

• Major advances in clinical ability to treat previously untreatable acute conditions, such as coronary artery bypass graft;

• Development of new procedures for discovering and treating secondary diseases within a disease, such as erythropoietin to treat anaemia in dialysis patients;

• Expansion of the indications for a treatment over time, increasing the patient population to which the treatment is applied;

• Ongoing, incremental improvements in existing capabilities, which may improve quality;

• Clinical progress, through major advances or by the cumulative effect of incremental improvements, that extends the scope of medicine to conditions once regarded as beyond its boundaries, such as mental illness and substance abuse.

The effect of a particular new technology on healthcare expenditures depends on a variety of factors. Central to any calculation is the impact on the treatment cost per individual patient. Does the new technology supplement existing treatment? Is it a full or partial substitute for current approaches? Will the direct costs of the new technology affect the use or cost of other healthcare services such as hospital days or physician office visits?

A second factor relates to the level of use that a new technology achieves. Does the new technology extend treatment to a broader population? Greater availability of technologies such as MRI, CT, coronary artery bypass grafting, angioplasty, cardiac and neonatal intensive care units, as well as PET are associated with greater per capita use and higher spending on these services. The impact of this is dependent on the kind of healthcare delivery system in place. In non-budgeted 'open' healthcare systems, such as the U.S. and some EU countries, the unrestrained use of technologies result in their broad application, thereby incurring high healthcare costs. Nations with a greater degree of health system integration and regulation have relied on expenditure controls and global budgets to control costs. Although diffusion of technology takes place more slowly in more tightly budgeted systems, the use of innovative technologies in those systems tends to catch up over time.

Diffusion of New Technologies in the U.S. & EU: The Case of PET/CT

The type of healthcare delivery system impacts on the diffusion of medical technology, as is well illustrated in the case of PET/CT. The rapid growth of PET/CT in the U.S. can be attributed to the highly competitive nature of the healthcare business. More than 40% of the approximately 2,000 PET/CT scanners worldwide are installed in the U.S. The culture of healthcare provision in Europe is very different, with central governments controlling expenditure rather than competing independent hospitals. This led to significant discrepancies in the availability of PET and PET/CT imaging throughout western Europe.

The applicability and recognition of PET/CT as an imaging modality in diagnostic oncology is affected by several factors in Germany. Reimbursement seems to be a major obstacle for the diffusion of PET/CT in Germany. Despite studies by Dietlein et al*, showing the cost-effectiveness for several PET indications, the Federal Joint Committee of Physicians and Health Insurance Funds in Germany issued a statement in 2002 refusing reimbursement for outpatient PET studies. This decision dramatically reduced funding of PET and PET/CT studies, limiting reimbursement for in-patients and self-financing private patients.

Additionally, excessive requirements for regulatory approval of radio-pharmaceuticals and fear of radiation levels are serious problems influencing the development of PET and PET/CT scanners. In Germany, approximately 55 PET/CT systems are in clinical use (April 2009) in university medical centres, community hospitals as well as private practices. Approximately 30% of the university medical centres still do not have access to PET/CT imaging seven years after introduction of this technique into clinical routine (personal communication with different vendors).

It is not possible to directly measure the impact of new medical technology on total healthcare spending; rather, innovation in the healthcare sector occurs continuously, and the impact of different changes interrelate. The size of the health sector (e.g., percentage of gross domestic product) and its diversity (numbers of procedures, products, and interventions) also renders direct measurement impractical.

Thus, economists have used indirect approaches to estimate the impact of new technology onto healthcare costs. In a landmark paper, Newhouse* determines the impact of medical technology on healthcare spending by first estimating the impact of factors that can reasonably be accounted for (e.g., spread of insurance, increasing per capita income, aging of the population, supplier-induced demand, etc.). He concludes that the factors listed above account for well under half of the growth in real medical spending, and that the bulk of the unexplained residual increase is to be attributed to technological change – what he calls "the enhanced capabilities of medicine."

Medical Technology Assessment/ Avoidable Cost Drivers

Medical Technology Assessment is a multidisciplinary field of policy analysis that evaluates the medical, social, ethical and economic implications of the introduction, development and diffusion of a technology. There are three main causes why medical technology is not being used cost-effectively.

First, patients do not pay directly for the healthcare they receive, so they sometimes make unreasonable demands on physicians regarding their diagnostic work-up or subsequent treatment.

Second, a new technology may be adopted because of its clinical superiority to existing technologies, but there is no market mechanism to ensure that it will be used where it is clinically most appropriate or where it offers highest value for a patient compared with other diagnostic or treatment options.

Third, because there is no market mechanism for determining the value of medical technology, there is currently no generally accepted screening process to assess its value. In the diagnostic imaging technology category, increases are largely driven by growth in the number of installed machines. This has led to overcapacities in many areas and created incentives for doctors to prescribe unnecessary procedures. Also, direct-to-consumer marketing fuels blind demand among consumers for advances in devices and drugs.

Factors Affecting the Growth of New Medical Technology

Many factors influence innovations in medical care. Consumer demand for better health is a prime factor. Research shows that the use of medical care rises with income: A wealthy population provides a fertile market for these innovations. Consumer demand is affected by increased public awareness of medical technology through the media, the internet, and direct-to-consumer advertising.

Health insurance systems that provide payment for new innovations also encourage medical advances. Medical treatments can be very expensive. Their cost would be beyond the reach of most people unless their risk of needing healthcare could be pooled though insurance. The presence of health insurance provides some assurance to researchers and medical suppliers that patients will have the resources to pay for new medical products, thus encouraging research and development. Equally, the promise of better health through improvements in medicine increases demand for health insurance, as consumers look for ways to assure access to the highest level of medical care.

Other factors driving the continuing flow of new medical technology include the desire by professionals to find better ways to treat their patients. Like most other professionals, healthcare workers are also motivated by professional goals (e.g., peer recognition, tenure, prestige) to find ways to improve practice. Furthermore, direct providers of care may incorporate new technology because they feel the need to offer the “latest and best” to compete with other providers for patients. Commercial interests such as those inherent to pharmaceutical companies and medical device makers represent the dominant force driving medical innovation.

Its profound impact is easily visualised by examining medical innovation over a 40-year period in Germany. The difference is vast – commercially motivated innovations made in Germany saved many lives, while at the same time making healthcare considerably more expensive. Finally, public and private investments in basic science research lead directly and indirectly to improvements in medical practice – government sponsored investments in basic science are increasingly regarded as programmes to assure economic prosperity.

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