Background Information

Roche Diagnostics

HEALTH ECONOMICS:
OPTIMIZING RESOURCES IN PUBLIC HEALTHCARE SYSTEMS

Health expenditures are rising continuously all over the world. The WHO estimates that 2,500 billion US dollars are spent in this area each year. Especially in the OECD states (Organization for Economic Co-operation and Development) and particularly in the USA the proportion of health expenditures of the Gross Domestic Product (GDP) has grown significantly over recent years to its current level of about 13% (or $ 5,267 per capita annually[1]). This development is likely to continue because of rising life expectancy, the desire for the best possible therapy and the use of innovative technology. Health economics as a sub-discipline of economics examines how existing resources in public healthcare systems can be spent more efficiently. For instance, resources saved by more accurate diagnostics and therapies may be used in other areas of immediate medical need or to treat additional patients who otherwise might not receive medical care at all. Additionally, a more economical approach in healthcare systems could also provide resources for further basic research initiatives. Modern diagnostics can play an important role to achieve these goals – by enabling personalized therapies as well as through developing innovative tests, thus becoming a main driver for medical *and* economic innovation.

[1] WHO, 2004

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Facts & Figures

- An average of 81% of the total of 2,500 billion US dollars mentioned above is spent on treatments, hospital stays and rehabilitation measures.
- A further 15 % are spent on drugs while only 4 % are needed on diagnostic services including laboratory diagnostics (which accounts for about 1% of the costs). Given this comparatively low portion, diagnostics therefore has a huge potential to improve the economic use of healthcare resources by enabling a more efficient disease detection and therapies:
  - Annual direct and indirect costs for heart failure in the US amount to $27.9 billion[2]. Several studies show that by using modern methods of analysis the overall costs of both, diagnostics and therapy of heart failure, could be reduced by up to 50%[3].
- The worldwide portion of healthcare expenditures varies between 7% and 14 % of the GDP, depending on the country.[4]
- So-called "Adverse Drug Reactions" (ADR, meaning undesirable, individual reactions on a certain treatment) account for 5 % of hospital admissions increasing costs by an average $ 2,500 per patient and cause additional costs of around 4 billion $ per year in the US alone.
  - Personalizing therapy with the help of pharmacogenetic testing can significantly improve patient care and reduce health care costs by preventing ADRs, e.g. over-reactions against drugs like allergies up to letal effects. Experts estimate that variations in the genetic profile of patients are a major factor in 10-20% of ADRs and can play a significant role in generating an additional 15-40% of cases. Pharmacogenetic diagnostics could thereby be expected to directly save 10-20,000 lives in the US alone.

Consideration of medical costs and benefits shows the huge impact diagnostics can have on medical care. As said above diagnostics takes up a comparatively low proportion of the overall budget (4%), but unlock a significant potential for efficiency throughout the medical supply chain. Diagnostic tests for predisposition, prevention, early detection, diagnosis and therapy monitoring can therefore play a significant role in the optimization of treatment, thus acting against a general increase in costs. Health economics for the healthcare industry therefore means to develop and market technologies and products that support healthcare professionals in their efforts to use healthcare funds more efficiently. The growing impact of health economics will drive the use of model calculations to examine and evaluate individual

[2] American Heart Association. Heart Disease and Stroke Statistics, 2005

[3] Siebert U, Januzzi JL, Beinfeld MT, Cameron R, Gazelle GS. Institute For Technology Assessment, Massachusetts General Hosp, Harvard Med School, Boston, Massachusetts. Circulation 2004; 110:369 (Suppl III)

[4] WHO, 2004

treatment concepts and their alternatives from the socio-economic perspective. Besides direct medical costs such as hospitalization, therapies, drugs and diagnostic tests, the sum of consequential or indirect costs resulting from a selected disease management or treatment decision will be included in this equation in the future.

And the future? Although all of the most prevalent and lethal diseases that afflict modern societies can benefit from improved diagnostic tests, there are a couple of areas that are particularly important as they are associated with huge distress and high economic costs. Especially in the area of cardiovascular diseases, cancer and Alzheimer's disease there is an urgent need for new, even simpler and more reliable markers to enhance early diagnosis, to improve prevention and secure adequate treatment. The rising importance of economic considerations will also demand some modification and re-thinking from healthcare providers as well as from public health care systems.

Advances in sciences led to new insights in the molecular aspects of certain diseases and allowed the development of new diagnostic technologies, for example pharmacogenetic tests which detect genetic variations that alter the ability to metabolize certain drugs. Roche Diagnostics' already available AmpliChip CYP450 Test is the first test with regulatory clearance and an important tool for healthcare providers to personalize treatment. This test detects genetic variations which alter the ability of a patient to metabolize certain drugs, thus allowing physicians to define therapies that meet this individual's need.

Diagnostics will expand its important role in the conflict between continuously improving healthcare and the need to economize increasing healthcare expenditures. Beyond its medical benefits the future success of a novel diagnostic test will therefore heavily depend on its potential to create economic value within the entire treatment process. In the end, however, the patient has to remain the focal point of all essential health-economic deliberations concerning patient-related diagnostic and treatment measures. True progress in context of better medical care, therapy and prevention will only be achieved when patients can be managed with the least invasive and most efficient procedures, thereby improving their quality of life.

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