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Variation of medical technology diffusion across OECD countries: an attempt of explanation

Lázaro P*, Fitch K, Monteagudo JL, Berra A, Luengo S.

Health Services Research Unit, Instituto de Salud Carlos III, Madrid, Spain.

Abstract

Background

Medical technology diffuses following a wide variation of patterns across different countries, and within the same country for different technologies, but little is known about factors affecting diffusion processes. To explore some of these factors, we performed a study on the diffusion of five "Big Ticket Medical Technologies" (BTT) across OECD (Organization for Economic Cooperation and Development) countries.

Methods

We studied the distribution of Computed Tomography Scanners (CT), Magnetic Resonance Imaging (MRI), Extracorporeal Shock Wave Lithotripters (ESWL), Cobalt Units (CU), and Linear Accelerators (LA) installed across the 24 OECD countries at the end of 1990 in terms of units per million inhabitants (pmi). Data were collected from the multinational manufacturing industry, national and international institutions, and literature. Information was subject to reliability and validity analyses. In order to test the hypothesis that Health Care Expenditures (HCE) contribute to explain the observed variations, we performed regression analyses considering the number of BTT units pmi as dependent variable and the HCE per capita (HCEpc) as explanatory variable using different regression models.

Results

The means and standard deviations (SD) among the 24 OECD countries in terms of units pmi were the following: For CTs, mean=11.5 (SD=10.5); for MRIs, mean=2.1 (1.9); for ESWLs, mean=0.9 (0.7); For CUs, mean 1.8 pmi (1.2); and for LAs, mean=4.6 (2.0). In the case of CTs, Japan was a clear outlayer with 55.5 CTs pmi. The mean of HCEpc among OECD countries was \$1,128 (SD=\$462). Using simple linear regression models, correlation was found between HCEpc and: MRIs pmi ($R^2=0.40$; $p<0.001$), LAs pmi ($R^2=0.55$; $p<0.0001$), and CTs pmi when Japan, as an outlayer, is excluded ($R^2=0.62$; $p<0.00001$).

Conclusions

1) Large variations were observed in the distribution of BTTs among OECD countries when controlling for population. 2) Although health care expenditures contribute to explain part of the variation for some technologies, a large residual remains to be explained. 3) Further research is needed to increase our knowledge on factors affecting the diffusion of medical technology. We suggest as key factors to be tested in explanatory or predictive hypotheses the following: regulatory mechanisms; economic incentives for health care providers; private (for-profit) versus public ownership proportion of technologies; number and distribution of medical specialists; and the role of the domestic manufacturing industry.

* Current Address: Pablo Lazaro y de Mercado. Técnicas Avanzadas de Investigación en Servicios de Salud (TAISS). Cambrils 41-2, 28034, Madrid. Spain. E-mail: plazaro@taiss.com.