Simulation of the impact of pharmacogenetic monitoring of cytochrome P450 2C19 in patients on clopidogrel treatment

A. López López¹, N. Martínez- López de Castro¹, M. Álvarez Payero¹, N. García Beloso¹, D. Robeles Torres¹, M. Couñago Fernández¹, M. Altions Lara¹, P. Prado Montes¹, A. Paradela Carreiro¹.
¹Álvaro Cunqueiro Hospital, Pharmacy Service, Vigo, Spain.

Background

Clopidogrel is biotransformed to its active thiol derivative primarily through cytochrome P450 2C19 (CYP2C19). Carrying the CYP2C19*2 allele has been associated with an increased rate of cardiovascular events.

Objectives

The aim is to assess the possible impact of pharmacogenetic monitoring of the CYP2C19 cytochrome in patients treated with clopidogrel.

Material and methods

We estimated the slow/intermediate metabolizer patients on clopidogrel treatment during 2020 in a health area of 564789 inhabitants (frequency of CYP2C19*2 in Europeans: 18.3% [1]). We used the relative risk (RR) of suffering a major adverse cardiovascular event in CYP2C19*2 carriers versus noncarriers (1.33) [2]. We calculated the attributable risk in exposed (AR) and the number of impact in exposed subjects (NIE). We estimated an incidence of major cardiovascular events in clopidogrel-treated patients of 12.1% [3], and the number of patients with a cardiovascular event attributable to carrying the CYP2C19*2 allele. We calculated the cost of an average hospital stay of 5 days and a cost per stay/day of 525 €.

Results

103,356 inhabitants could present the CYP2C19*2 allele in our reference area. In 2020, 3,643 (6.64%) patients received clopidogrel, 667 (0.1%) could present reduced metabolism. AR=24.8%. NIE=4.6≈5. For every 5 patients carrying CYP2C19*2 on clopidogrel treatment, there would be one major cardiovascular event attributable to this polymorphism per year. In our health area, 81 patients would fail clopidogrel treatment and have a cardiovascular adverse event. In 18, this event would be due to being a CYP2C19*2 carrier. It would involve 90 days of hospital stay and a cost of 47,250 €.

Conclusion

Pharmacogenetic monitoring of clopidogrel could be a strategy to be taken into account to reduce morbidity in patients carrying the CYP2C19*2 allele and to avoid hospital admissions and health care costs. Pharmacy services should be involved in this area in order to provide pharmacotherapy adapted to each patient.

2. Sofi et al., 2010. doi:10.1160/TH09-06-0418.