

# The regional variation in drug utilization after ischemic stroke in Taiwan, 2004-2012

Yen-Chun Lin(林彥君)<sup>1</sup>, **Ching-Lan Cheng(鄭靜蘭)**<sup>1,2</sup>, Yi-Chi Chen(陳奕奇)<sup>3</sup> and **Yea-Huei Kao Yang(高雅慧)**<sup>1,2</sup>

<sup>1</sup> Institute of Clinical Pharmacy and Pharmaceutical Sciences, National Cheng Kung University, Tainan, Taiwan.

<sup>2</sup> School of Pharmacy, Institute of Clinical Pharmacy and Pharmaceutical Sciences, Health Outcome Research Center, National Cheng Kung University, Tainan, Taiwan.

<sup>3</sup> Department of Economics, National Cheng Kung University, Tainan, Taiwan.

**Background:** Despite the advances in the quality and delivery of stroke care, regional disparities in medication utilization persist. With the limited resources, mapping the distribution of drug utilization may provide the government with some important clues to focus their policy efforts in targeted areas.

**Objectives:** To identify the geographic variations in drug utilization after ischemic stroke across 349 townships in Taiwan, by using spatial analysis.

**Method:** We conducted a cohort study by using 2004-2012 National health insurance research database (NHIRD), involving patients with first-ever ischemic stroke. All patients were identified in the region of residence by townships. We estimated post-stroke drug utilization for the following 3 months of each township, and the dosage of each prescription was converted into defined daily doses (DDD) per person to measure the consumption of medications. Local Indicators of Spatial Association (LISA) were applied to detect the spatial autocorrelation and clusters of drug utilization, providing information on types of spatial association at the local level. The high-high(HH) association (hot spot) is the local clusters of high values, while the low-low(LL) association (cold spot) is the local clusters of low values.

**Results:** A total of 165,732 patients were included, with a mean age of 67.5 years and 58.5% male. There were wide variations in utilization of post-stroke medications across Taiwan. The DDD/person of thrombolytic therapy increased from 0.004 to 0.025 between 2004 and 2012, and utilization was higher in midwestern Taiwan, accounting for 88.9% of hot spots, while the cold spots clustered in Pingtung City and eastern area. The prescriptions of antiplatelet agents and lipid-lowering agents clustered in the southern townships (71.7% of hot spots; 75% of hot spots) such as Kaohsiung and Tainan City, whereas anticoagulants prescribed more frequently in northern (52.2% of hot spots) and eastern Taiwan (36.4% of hot spots).

**Conclusion:** According to the results, we offered a powerful and real-world evidence, suggesting the government or healthcare providers policy promotion in some townships to improve their healthcare systems and drug utilization, narrowing the gaps of geographical inequalities of health care in Taiwan.