

International comparison of regional variations in ischemic stroke care between Japan and the United States

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Little is known about the regional variations in healthcare in Japan

General awareness:

- Understanding geographic variations in healthcare is an important step in improving the provision of care, as this can increase clinical, political, and public awareness of unwarranted variations.

OECD report [1]

- This report did not present any information on the geographic variations in healthcare utilization in Japan.

Systematic review [2]

- Most analyses on regional variations in cardiovascular diseases (including stroke) have been conducted in the US, UK, and CA.

[1] OECD, *Geographic Variations in Health Care: What Do We Know and What Can Be Done to Improve Health System Performance?*, OECD Health Policy Studies, OECD Publishing. 2014.

[2] Corallo AN, Croxford R, Goodman DC, et al. A systematic review of medical practice variation in OECD countries. *Health Policy* 2014.

Barriers to small-area analyses in Japan:

1) Limited data availability

Many researchers recognize that claims data have highly useful applications for epidemiological studies.

On the other hand, legal matters concerning privacy protection have discouraged the secondary use of claims data.

Japan's Ministry of Health, Labour and Welfare (MHLW) began the establishment of the National Claims Database (NDB) in 2011.

This database includes records of interactions between patients and providers for inpatient, outpatient, and emergency care episodes, and its use for research purposes has been sanctioned based on the *Act on Assurance of Medical Care for Elderly People*.

Barriers to small-area analyses in Japan:

2) Difficulties in identifying acute patients through claims data

- There are differences in mortality risks and care needs between the acute care and post-acute care phases
 - Each in-hospital episode should be identified as being either the acute care phase or the post-acute care phase, as appropriate.
- In the **US**, acute care hospitals and critical access hospitals are defined, and in-hospital episodes with acute care are clearly identifiable
- In **Japan**, there are no clear definitions of acute care hospitals and/or critical access hospitals.
 - Many JP hospitals provide not only acute care, but also post-acute care.

Therefore, a “Japanese-oriented identification method” is needed.

- In this study, hospital episodes involving the provision of acute care according to a predetermined list of guidelines are regarded as “acute care hospital episodes”.

Objectives

- To investigate the regional variations in outcomes and processes of acute ischemic stroke care in Japan
- Through comparisons with the corresponding regional variations in the US, we aim to interpret the unwarranted variations in Japan using a relative perspective

Data sources and study populations

	Japan	The US
Name of Data	National Claims Database	Medicare Claims Data
Regions	51 Secondary Medical Areas	306 Hospital Referral Regions
Comprehensiveness	A portion of Japan (8/47 prefectures)	Nationwide
Target population	National Health Insurance or Long Life Medical Care System Enrollees	Full enrollment in Medicare Parts A or B (HMO not included)
	65 years and over	65 years and over
Inpatient episodes with acute ischemic stroke	ICD-10 I63\$	ICD-9CM
	No hospitalization for ischemic stroke within 1 month prior to index episode Received acute care in the 2009 JP GL	Admitted to acute care hospital or critical access hospital
Study period	April 2010—March 2012(2 yrs)	Jan 2011—Dec 2011 (1 yr)

Measures and Statistical Analysis

1. [Risk-adjusted] In-hospital Mortality
 - JP: age-sex adjustments by multilevel logistic regression with bootstrapping
 - US: age-sex-race adjustments using an indirect method
2. [Risk-adjusted] In-hospital Spending
 - JP: age-sex adjustment by multilevel gamma regression with bootstrapping
 - US: age-sex-race adjustment using an indirect method
3. Length of stay
 - JP: crude
 - US: crude
4. Number of physicians in charge of treating ischemic stroke cases per 100,000 population who are 65 years and older
 - JP: crude rate; Neurosurgeons, Neurologists and Cardiologists
 - US: crude rate; Neurosurgeons, Neurologists and Internal Medicine Physicians

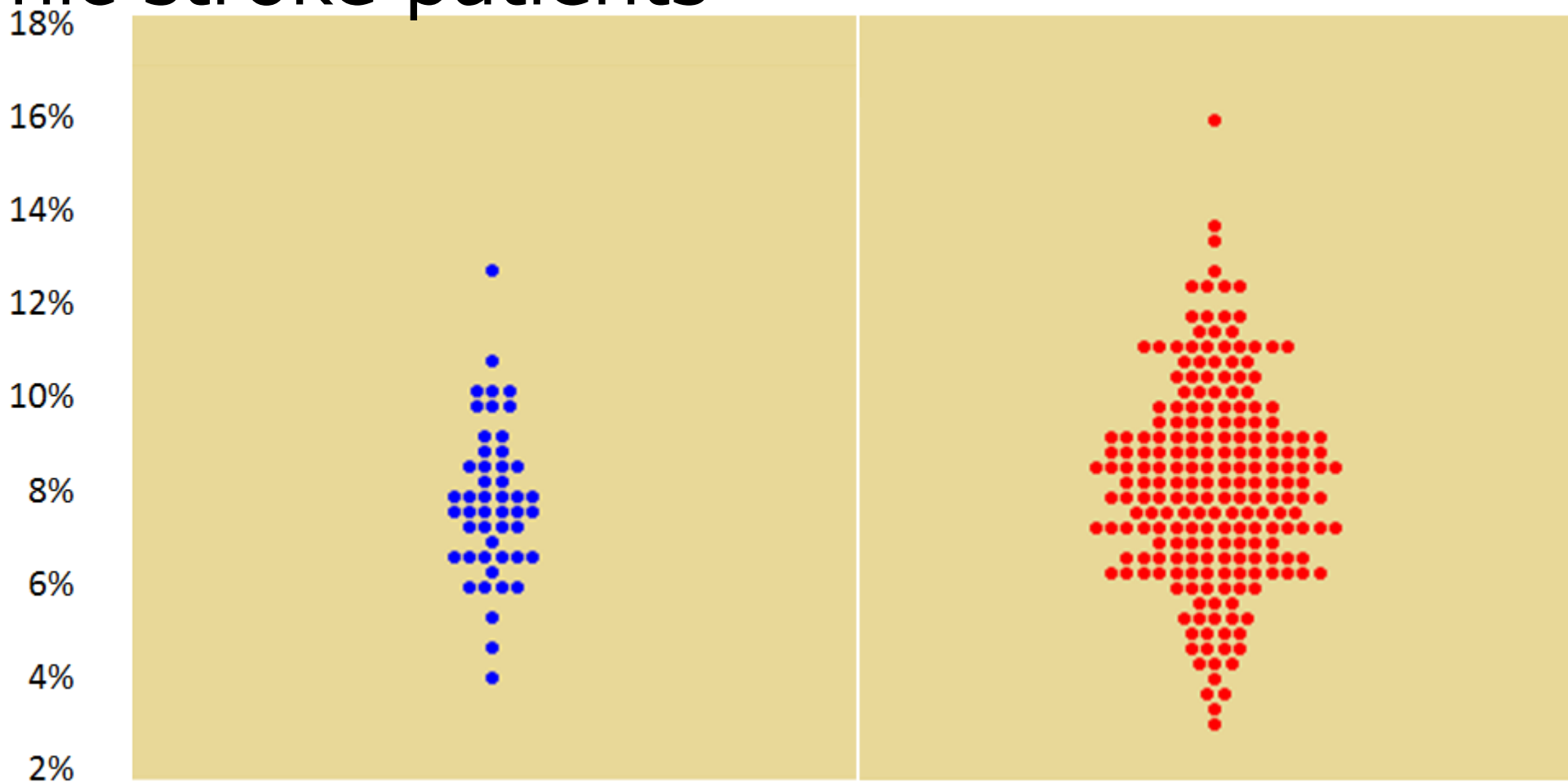
Results

Number of acute ischemic stroke hospitalization episodes:

JP: 49,440 episodes

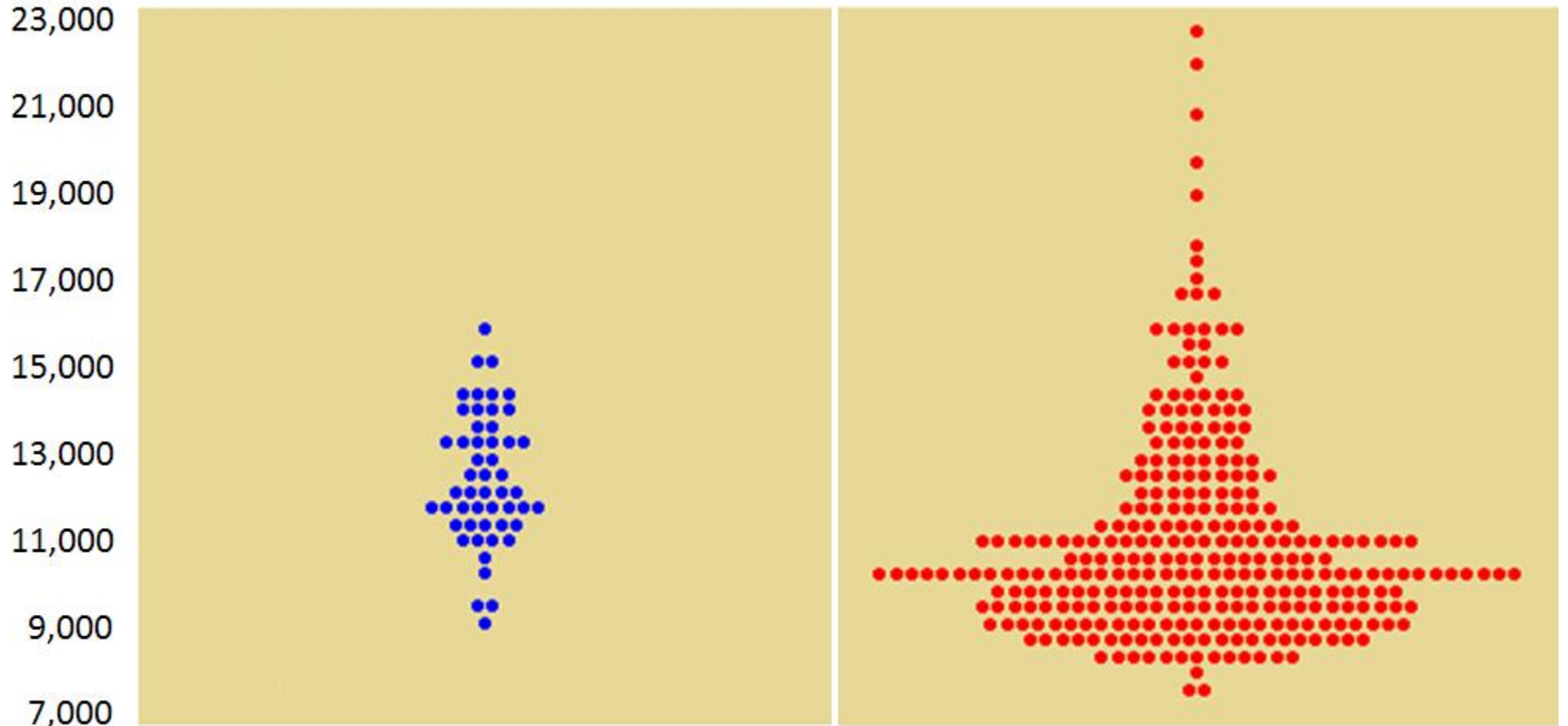
US: 227,865 episodes

Distribution of in-hospital mortality in ischemic stroke patients



	Japan (n=49)	US (n=218)
Mean, Coefficient of variation	7.62%, 0.217	8.02%, 0.264

Distribution of in-hospital spending in ischemic stroke patients



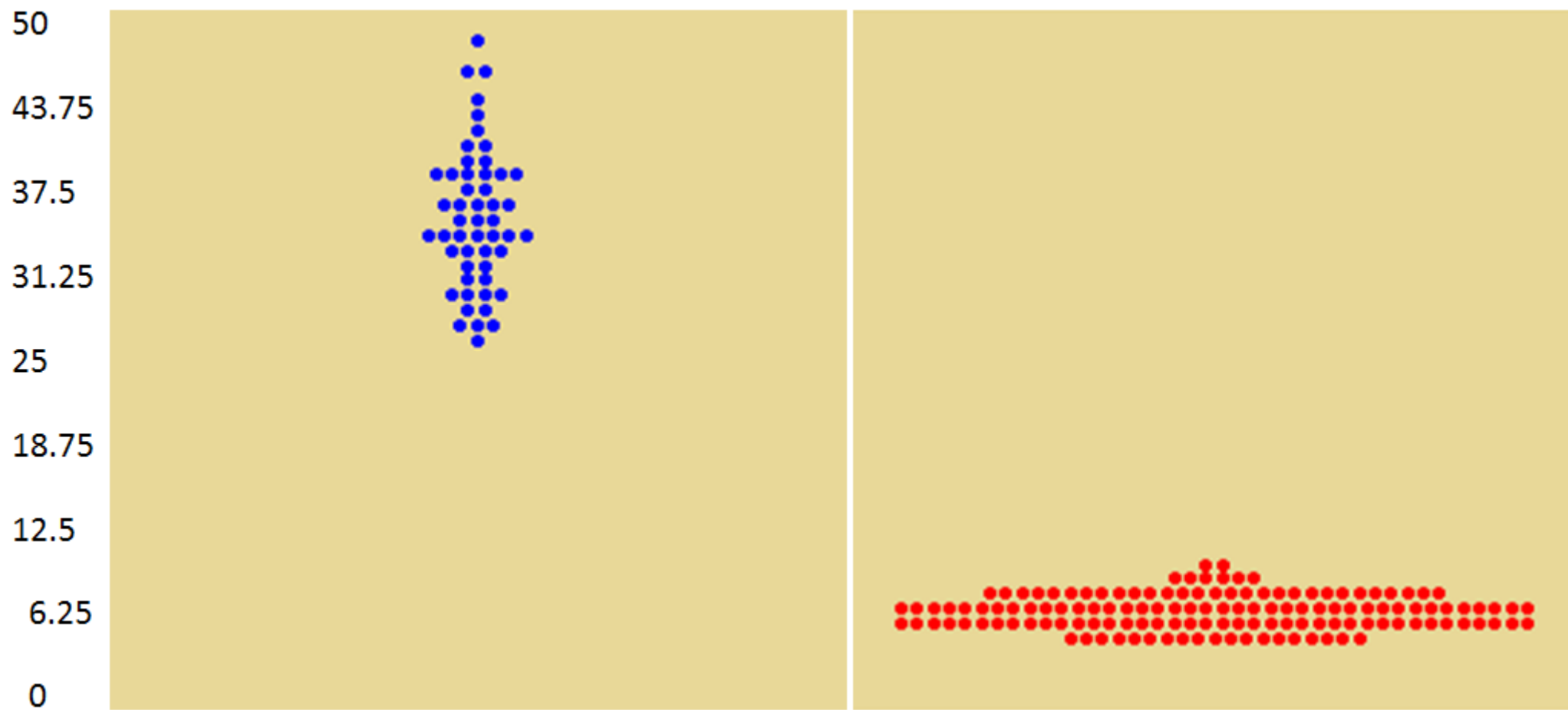
Japan (n=51)

US (n=306)

Mean, Coefficient of variation
US\$12,202; 0.121

Mean, Coefficient of variation
US\$10,817; 0.220

Distribution of length of stay in ischemic stroke patients



Japan (n=51)

US (n=306)

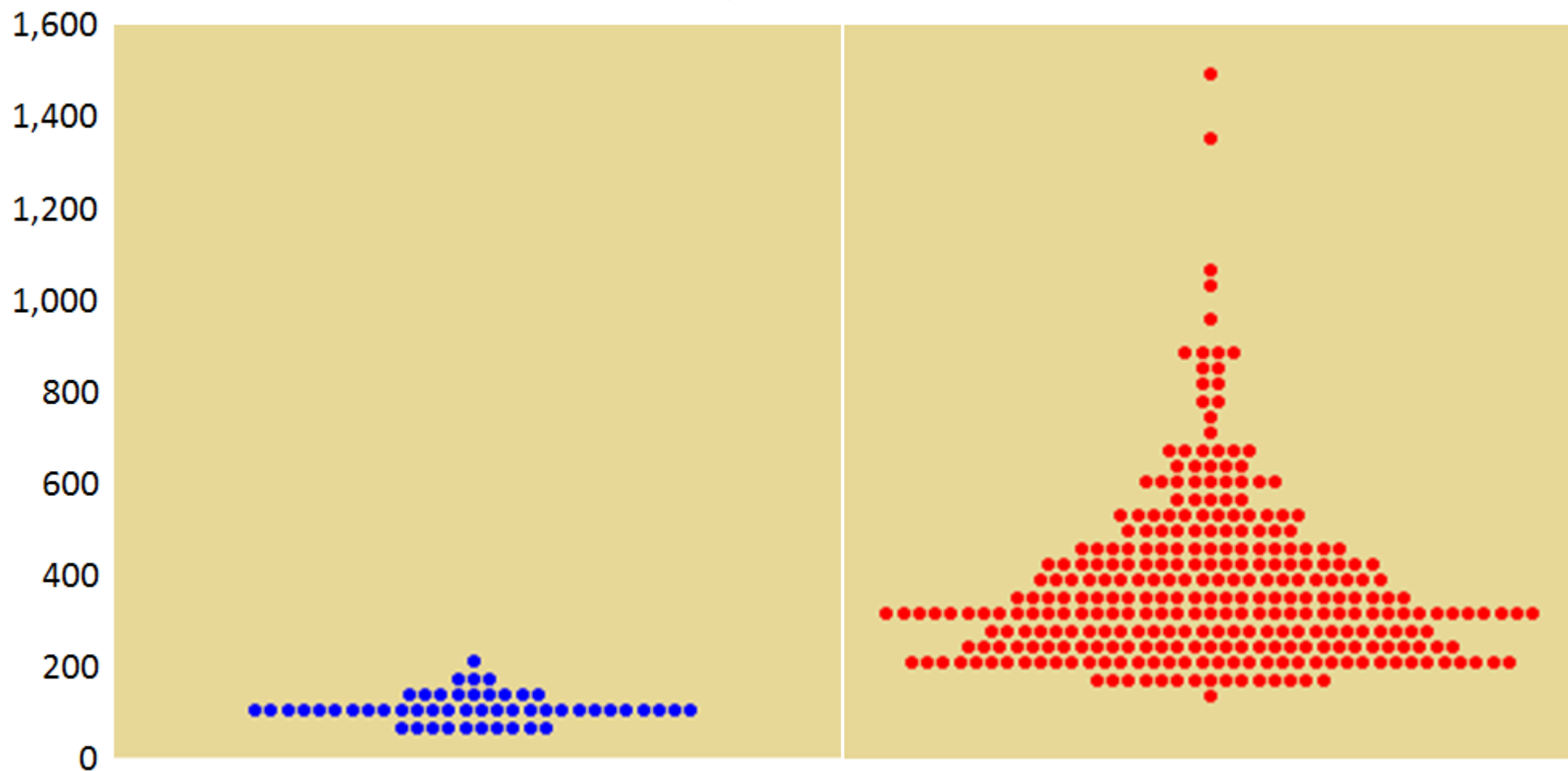
Mean,

Coefficient
of variation

34.7 days, 0.146

5.6 days, 0.154

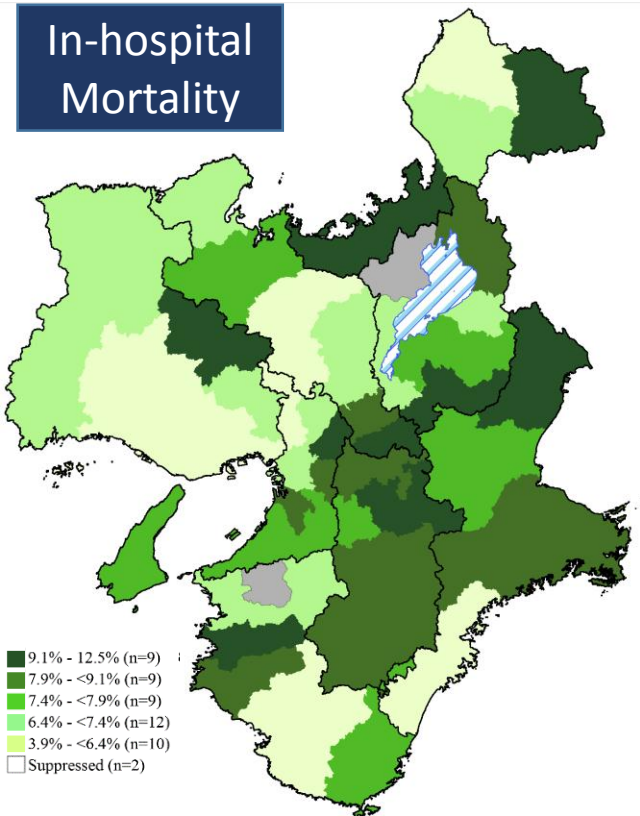
Distribution of physicians in charge of treating ischemic stroke cases per 100,000 population aged 65 years and older



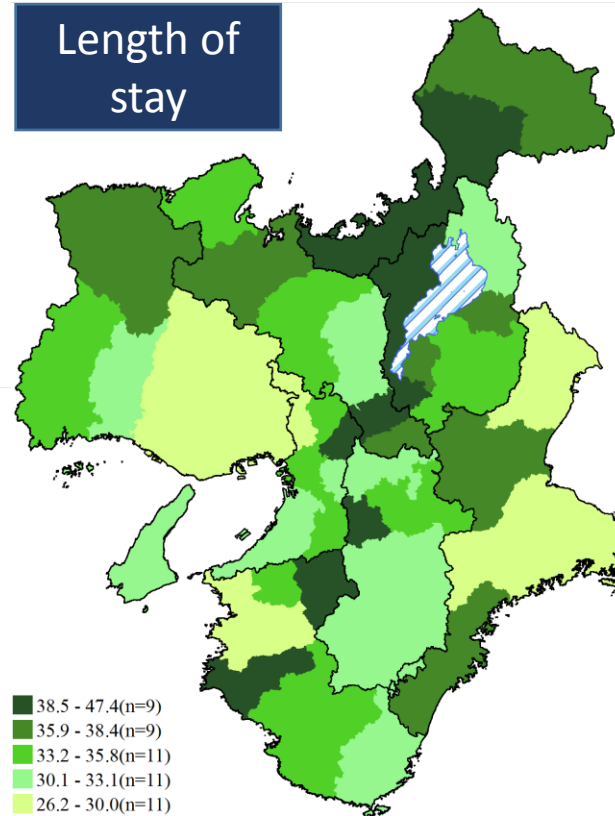
		Japan (n=51)	US (n=306)
Mean,	Coefficient of variation	65.8, 0.510	346.9, 0.558

Maps of each 4 measures of acute ischemic stroke episodes in Japan

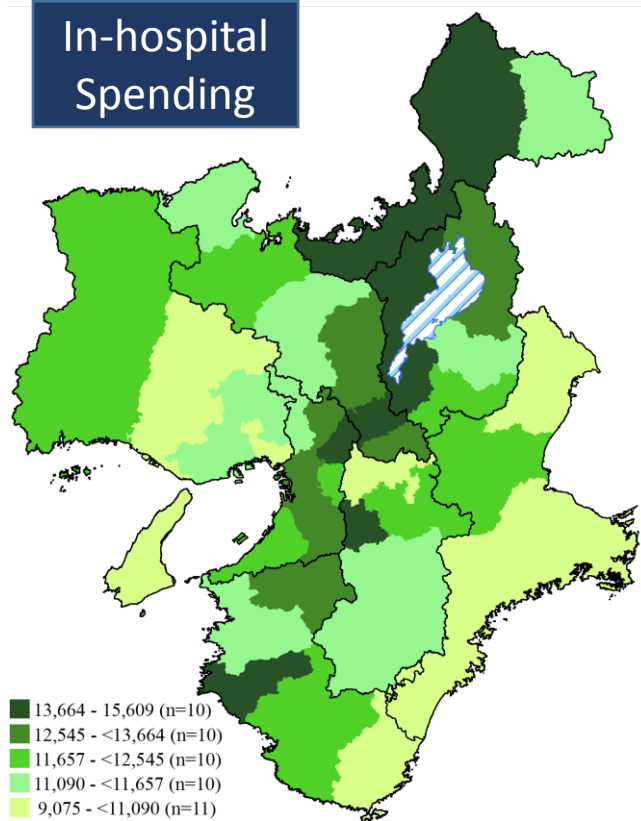
In-hospital Mortality



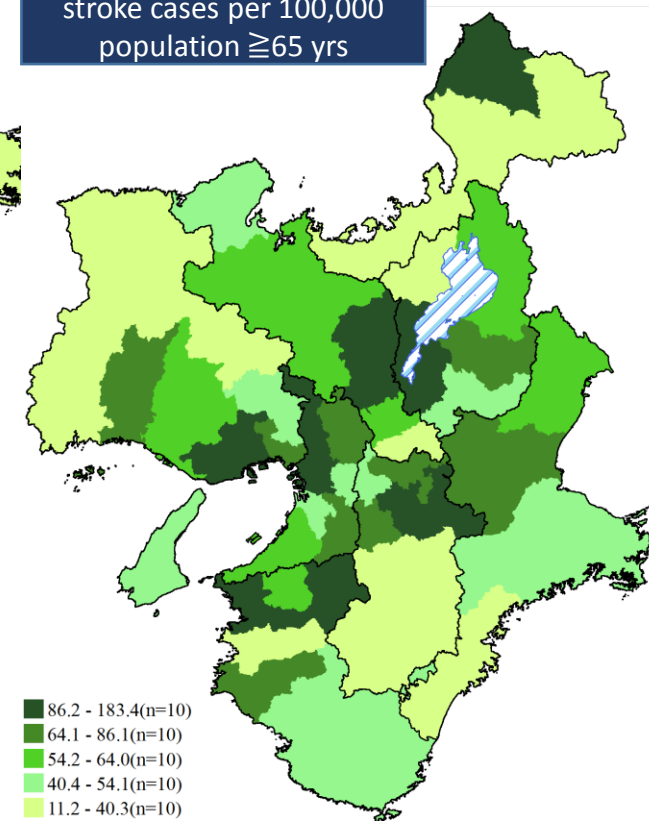
Length of stay



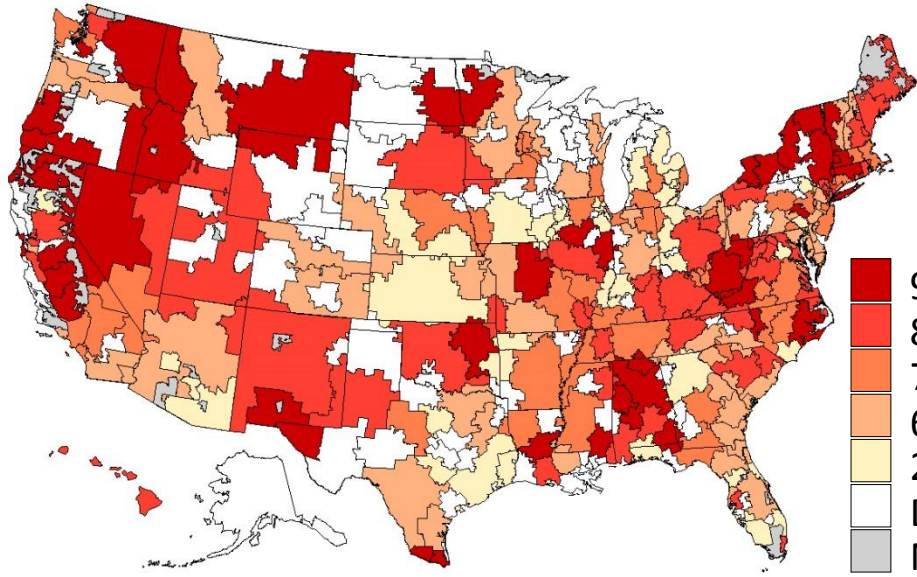
In-hospital Spending



Physicians in charge of stroke cases per 100,000 population ≥ 65 yrs

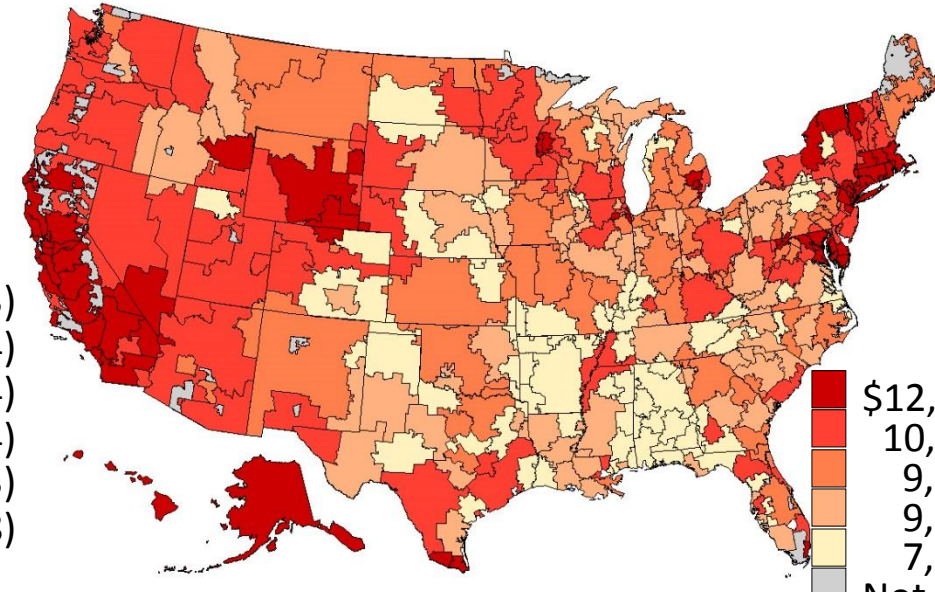


Maps of each 4 measures of acute ischemic stroke episodes in the US



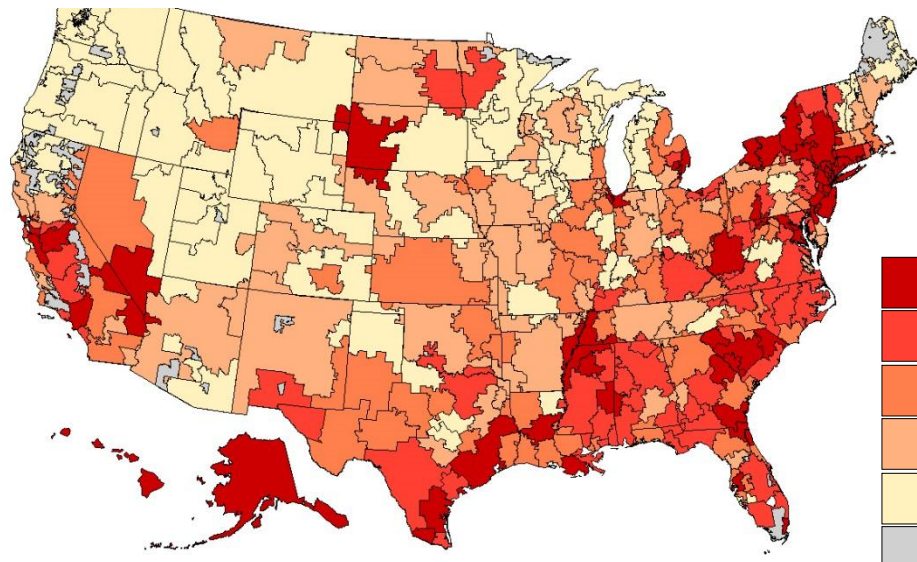
In-hospital Mortality

Dark Red	9.7 to 16.1%	(43)
Red	8.5 to < 9.7%	(44)
Orange-Red	7.4 to < 8.5%	(44)
Orange	6.2 to < 7.4%	(44)
Light Orange	2.9 to < 6.2%	(43)
White	Data suppressed	(88)
Grey	Not populated	



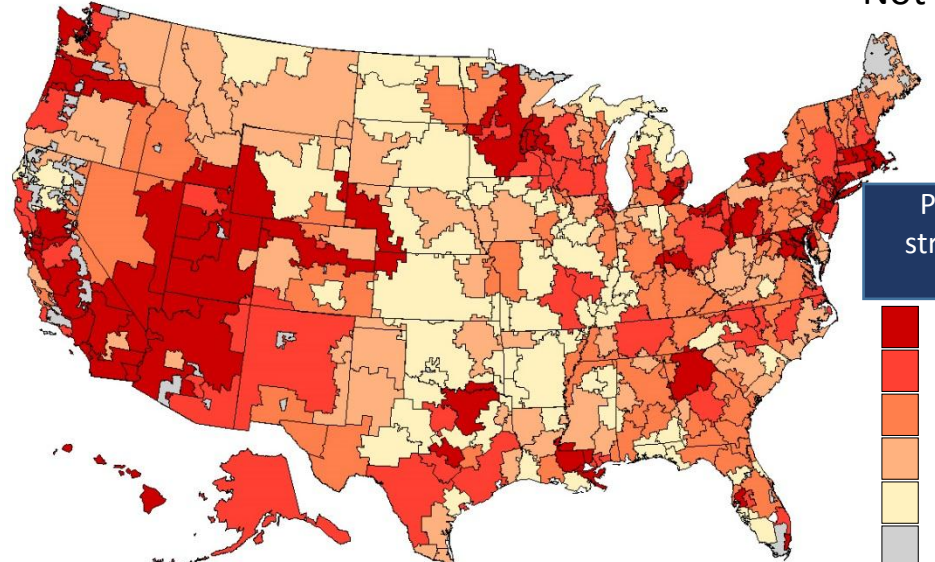
In-hospital Spending

Dark Red	\$12,300 to 22,470	(61)
Red	10,650 to < 12,300	(61)
Orange-Red	9,880 to < 10,650	(61)
Orange	9,040 to < 9,880	(62)
Light Orange	7,330 to < 9,040	(61)
White	Data suppressed	
Grey	Not populated	



Length of stay

Dark Red	6.3 to 9.7	(59)
Red	5.8 to < 6.3	(59)
Orange-Red	5.4 to < 5.8	(62)
Orange	5.0 to < 5.4	(59)
Light Orange	3.5 to < 5.0	(67)
White	Data suppressed	
Grey	Not populated	



Physicians in charge of stroke cases per 100,000 population ≥ 65 yrs

Dark Red	449 to 1,489	(62)
Red	336 to < 449	(61)
Orange-Red	268 to < 336	(61)
Orange	194 to < 268	(61)
Light Orange	90 to < 194	(61)
White	Data suppressed	
Grey	Not populated	

Summary of findings: mortality and spending

In-hospital mortality

- Our study did **not** reveal any systematic difference in national in-hospital mortality rates between the two countries
 - From a long-term perspective, mortality in Japan may be lower than that of the US
- However, the CV of in-hospital mortality in **Japan (.217)** was slightly lower than in **the US (.264)**.
 - Theoretically, regional units of analysis with smaller defined populations may contribute to larger observed variations

In-hospital spending

- The substantial differences in regional variations in in-hospital spending are likely to be associated not only with regional variations in the processes of care, but also with socioeconomic status

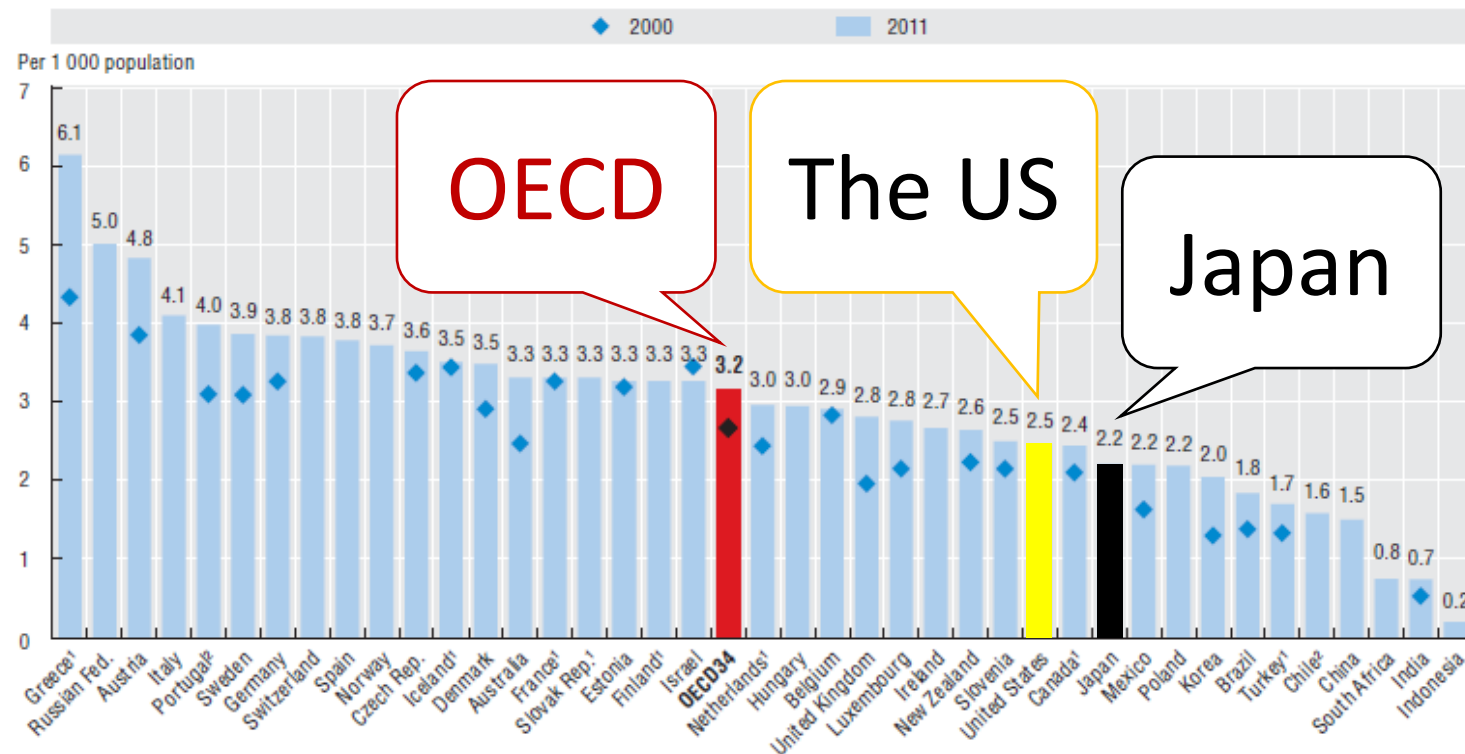
Summary of findings: length of stay

- Mean LOS in Japan (34.7 days) was substantially longer than that of the US (5.6 days)
- Possible reasons for the protracted LOS durations in Japan:
 1. Japanese hospitals tend to provide both acute and post-acute care during the same hospitalization episode
 2. Physicians are more likely to keep post-acute patients in hospitals until they are able to attain a relatively high level of independence in their activities of daily living. Additionally, there are small financial risks for Japanese physicians associated with long LOS durations because hospital fees are reimbursed through fee-for-service payments or per diem payments
 3. General patient preferences may also encourage physicians to extend discharge dates. These variations should be considered in the context of each country's care delivery system
- Economic incentives based on the “Per-diem payment system (DPC/PDPS)” in Japan and the “Per episode payment system (DRG/PPS)” in the US may be able to successfully control LOS (CV in JP: .146; US: .154)

Summary of findings: physicians for stroke care per elderly population

- There was slightly less regional variations in the number of physicians in charge of stroke care relative to the elderly population in **JP** than in **the US** (**JP:.510**; **US:.558**)
- Considering the rapid aging of **Japan's** population, the actual mean value for this measure may be currently more important than its regional variations

3.1.1. Practising doctors per 1 000 population, 2000 and 2011 (or nearest year)



Conclusions

- This study revealed substantial regional variations in ischemic stroke care in Japan using an analysis of the Japanese National Claims Database.
- International comparisons with the US supported the interpretation and understanding of our research findings.

Future work

- To obtain results with increased generalizability, a nationwide analysis in Japan is needed.
- Regional variations and their associated factors should continue to be investigated and compared with consideration to the intrinsic differences in national health care systems.

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