Stroke Burden and Stroke Services in Indonesia

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Stroke Burden and Stroke Services in Indonesia

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Abstract
Stroke is a major cause of death and disability in Indonesia. Stroke requires high-quality, fast, and precise management to prevent and avoid disability and death. Stroke can be prevented by adequately controlling the risk factors and encouraging healthy lifestyles. Efforts are needed to organize health promotion programs at the community level. More and a better distribution of neurologists and neurointerventionalists is needed. All hospitals should have a CT scan machine and stroke units. Telemedicine for stroke patients is a very promising endeavor for an integrated acute stroke management system.

Introduction

Indonesia is a transcontinental country in South East Asia comprising more than 17,500 islands and is home to 270 million people [1]. Approximately, 60% reside in Java. Indonesia has 34 provinces, 416 districts, 7,230 subdistricts, 98 cities, 8,488 urban villages, and 74,953 villages. The World Bank categorized Indonesia as a lower-middle income country as of July 1, 2021, with a gross national income per capita of USD 3,870 [2].

Burden of Disease

Stroke is a major cause of death and disability in Indonesia. Compared to other countries in South East Asia, Indonesia has the highest age and sex-standardized mortality (193.3/100,000) and disability-adjusted life years lost (3,382.2/100,000) [3]. Stroke prevalence is 0.0017% in rural Indonesia and 0.022% in urban Indonesia [4]. In the more recent RISKESDAS study, the overall prevalence was 10.9/1,000,000, with differing rates among the various provinces, lowest in Papua (4.9/100,000,000) and highest in West Kalimantan 14.7/1,000,000) [5]. According to the Indonesian Health Insurance (BPJS), in 2016, stroke health care costs were 1.43 trillion rupiah in 2016, it rose to 2.19 trillion Rupiah in 2017, and in 2018 it reached 2.57 trillion rupiah. Based on the Indonesian Family Life Survey (IFLS), the economic burden on households due to stroke was Int$0.29 billion in 2010 [6]. In the 2014 Indonesian Sample Registration System, stroke was the most common disease (21.1%) [7].

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Table 1. Healthcare services in Indonesia

Level	Healthcare facility	Timings	Staff	Services
Village	Integrated health posts (pos pelayanan terpadu-posyandu)	1 day a month	Volunteers	Health promotion and disease prevention
	Subhealth centers (puskesmas pembantu-bantu)	Daily, office hours	Nurse	Health promotion and disease prevention
	Mobile service units (puskesmas keliling-pusing)	1–4 times a month		As in puskesmas
	Private clinics	Daily, during, and usually after office hours	Doctor, nurse	Consultation, treatment
Subdistrict	Healthcare centers (puskesmas)	Daily, office hours Daily (24 h)	Doctor, nurse	Outpatient consultant, treatment Inpatient (may be available) – specialist, simple surgery May have laboratory
	Private clinics	Daily, during, and usually after office hours	Doctor, nurse	Consultation, treatment
District	First-level hospitals	24 h	Doctors including specialists, nurse	Outpatient consultation, treatment
	Private hospitals	24 h	Doctors including specialists, nurse	Inpatient, including simple surgery, laboratory Out- and inpatient treatment
	Private clinics	Daily, during, and usually after office hours	Doctor, nurse	Consultation, treatment
Province	Second-level hospitals	24 h	Doctors including specialists, nurses	Out- and inpatient treatment, more advanced procedures
	Private hospitals	24 h	Doctors including specialists, nurses	
Central	Tertiary hospitals	24 h	Doctors including specialists, nurses	Out- and inpatient treatment, more advanced procedures
	Centers of Excellence: National Stroke Hospital; National Brain Centre Hospital	24 h	Doctors including specialists, nurses	Out- and inpatient treatment, very advanced procedures

Vascular risk factors in the community were similar to surrounding countries except for the high frequency of insufficient physical activity among men (25.5%) and women (22.0%) and of cigarette smoking among men (76.2%) [3]. Hypertension explained 36–42% of all strokes in both sexes combined, while smoking in men explained 17% of strokes [8].

In a multicenter study of 5,411 hospitalized stroke patients, subarachnoid hemorrhage comprised 3.3%, intracerebral hemorrhage 29.6%, and ischemic stroke 67.1% [9]. Among ischemic stroke mechanisms, large artery atherosclerosis comprise 59.6%, small vessel disease 26.7%, cardioembolism 2.1%, other determined etiology 0.9%, undetermined etiology 9.8% [10]. Stroke knowledge among stroke survivors is low and independently related to medication adherence [11]. Stroke survivors find the disruptive result of their stroke affects their ability to maintain religious duties and contribute to their family [12]. Care givers experience heavy-heartedness, anger, disappointment, pity, sadness [13].

Organization of Services/Care

Community health services at the third level are provided by village-level integrated service posts, then second level health centers usually staffed by a nurse, while community health centers (Puskesmas) are at the top, usually staffed by a physician (Table 1). They provide preventative and maternal and child health care services. The total number of Puskesmas in Indonesia as of December 2020 was 10,205, comprising 4,119 inpatient health centers and 6,086 non-inpatient health centers. This represents a 5% increase compared to 2016 (9,767 units). Increasing the number of Puskesmas underscores the government's efforts in fulfilling access to primary health services. The ratio of Puskesmas to subdistricts in 2020 was 1.4 (the ideal ratio of Puskesmas to subdistrict is at least 1). Increasing the number of Puskesmas will assist the Integrated Noncommunicable Diseases Post (POSBINDU-PTM) program, an activity for monitoring and early detection of noncommunicable disease risk factors,

Table 2. Number and distribution of neurointervention facilities in Indonesia

Province	Neurointervention facilities, *n*
Aceh	1
North Sumatera	3
West Sumatera	1
Riau	1
Jambi	1
Lampung	1
South Sumatera	1
Bengkulu	1
Banten	3
DKI Jakarta	14
West Java	3
Central Java	3
DI Yogyakarta	2
East Java	8
Bali	4
West Nusa Tenggara	1
West Kalimantan	1
North Sulawesi	2
South Sulawesi	2
Papua	1
TOTAL	**54**

Fig. 1. Nurse station at stroke unit, Mardi Rahayu Hospital, Kudus-Central Java, Indonesia.

so that they can manage vascular risk factors and reduce stroke morbidity in the future [14].

The number of hospitals has also increased, from 2,601 in 2016 to 2,985 in 2020. Hospitals are grouped, based on facilities and service capabilities, into class A (60 hospitals – 2%), class B (436 hospitals – 14.6%), class C (1,550 hospitals – 51.9%), and class D (877 hospitals – 29.4%); the remaining 2% (62 hospitals) have not been assigned a class [14].

Hospitals of class A, B, and C in Java island have neurologists. Usually, these hospitals are equipped with imaging tools such as CT scans or MRI [15]. However, the distribution of hospitals type B and C is not even throughout the islands in Indonesia. Currently, Indonesia has 1 national stroke hospital located at Bukit-Tinggi, West Sumatra (built in 2007) and the National Brain Center Hospital (PON Hospital) in Jakarta (operating since 2013). The number of neurointervention facilities in Indonesia in 2020 is only 54, with details in Table 2 [14].

As for human resources, Indonesia has 1,200 neurologists and 56 neurointerventionalists, most of them practice in Java Island and are not distributed equally outside Java. For example, Jayapura, the capital city of Papua, covers an area of 940.0 km^2 with 398,000 people. It has 8 hospitals (2 of them class B and the others are class C). Only 5 hospitals have CT scan, 2 have stroke units (Fig. 1) and 2 have catheterization labs. There are 6 neurologists and 1 neurointerventionalists (personal communication with Dr. Ignatius Letsoin Sp.S., MSi. Med., FINS, FINA, General Hospital, Jayapura).Overall, the ratio to the population of neurologists is 1:108, neurointerventionalists 1:4,500, and neurosurgeons 1:1,350 [14].

Government and Nongovernment Actions

Some efforts have been made by the Minister of Health to reduce stroke burden in Indonesia. The first effort is promotive actions, such as encouraging regular health checks, stopping smoking, encouraging regular physical exercise, having a healthy diet, getting enough rest, and increasing stress coping measures. In Indonesian language, this is the "CERDIK" slogan ("CERDIK" means smart). "CERDIK" is an abbreviation of "Cek kesehatan rutin, Enyah rokok, Rajin aktivitas fisik, Di-it seimbang, Istirahat cukup, Kelola stress." Antismoking and active physical exercise campaigns were launched many years ago [16].

The second effort is a preventive action by encouraging people to increase self-awareness – through regular blood pressure measurements and cholesterol checks or at least once a year at POSBINDU-PTM or Health Service Facilities even for those who do not have noncommunicable risk factors. POSBINDU-PTM is expected to be able to conduct periodic health checks once a month. A pilot project has shown that a brief intervention to motivate physician-patient conversations about stroke prevention may improve these conversations in community health centers [17]. The third effort is a curative action by

strengthening health services and increasing human resources. The fourth effort is to improve rehabilitative services to prevent disability or recurrence of stroke [18].

Future Directions

Increasing public awareness and participation of avoiding stroke through mass media and social associations is the main effort to prevent an increase in the incidence of stroke. This awareness is the key to success of acute stroke management in the community. There is a need to improve health promoting and preventive actions in first-line health facilities for healthy living and also encourage more POSBINDU-PTM in order to control risk factors for noncommunicable diseases.

Increasing the capacity of human resources involved in the management of stroke patient services is an effort that is no less important. Neurologists could be better distributed throughout all islands of Indonesia. Knowledge update regarding the stroke management protocol or guideline is obligatory. This is already being done by the Indonesian Neurologist Association (PERDOSSI), the national neurological professional organization.

There is an impending crisis of physician shortage for acute stroke care. Few stroke patients are evaluated by vascular or general neurologists, resulting in low treatment rates with rt-PA, suboptimal care and slow clinical trial recruitment. Telestroke is an e-mechanism to expand stroke expertise from tertiary centers to hospitals with inadequate coverage. Many telestroke systems have leveraged fixed-line communications using ISDN or similar technologies to allow physicians interact with patients using sophisticated but proprietary audiovisual communication equipment. Physicians can review CT scans and interact with patients and caregivers in remote EDs (emergency departments). Tele-stroke can also shorten the distance and time between satellite hospitals and stroke experts in stroke centers at the main hospital. Based on the demographic factors of the islands and the number of remote areas, the use of telestroke would be highly desirable. To support this, all class C hospitals should have CT scan machines installed. All class B and C hospitals should have stroke units. Having mobile stroke services to reach stroke patients in remote areas would be a dream come true. Neurointervention such as thrombolysis and thrombectomy, which currently only exist in a few hospitals in Indonesia, needs to be further developed, expanded, and well distributed so that it can be carried out by all hospitals in Indonesia.

Conclusions

Stroke is a major cause of death and disability in Indonesia. Stroke requires high quality, fast, and precise management to prevent and avoid disability and death. Stroke can be prevented by adequately controlling the risk factors and encouraging healthy lifestyles. Efforts are needed to organize health promotion programs at the community level. More and a better distribution of neurologists and neurointerventionalists is needed. All hospitals should have a CT scan machine and stroke units. Telemedicine for stroke patients is a very promising endeavor for an integrated acute stroke management system.

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Statement of Ethics

The staff in Figure 1 have provided written informed consent for their image to be published.

Conflict of Interest Statement

Narayanaswamy Venketasubramanian is an associate editor of Cerebrovascular Diseases Extra. The other authors have no conflicts of interest to declare.

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Author Contributions

Narayanaswamy Venketasubramanian, Fenny L. Yudiarto, and Dodik Tugasworo conceptualized the paper, wrote the paper, and approved the final version.

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