PIT & MUKERNAS HISFARSI 2026 PEKANBARU-RIAU

Clinical Pharmacy in Stroke Care: Fast Action, Safe Medication, Better Outcomes

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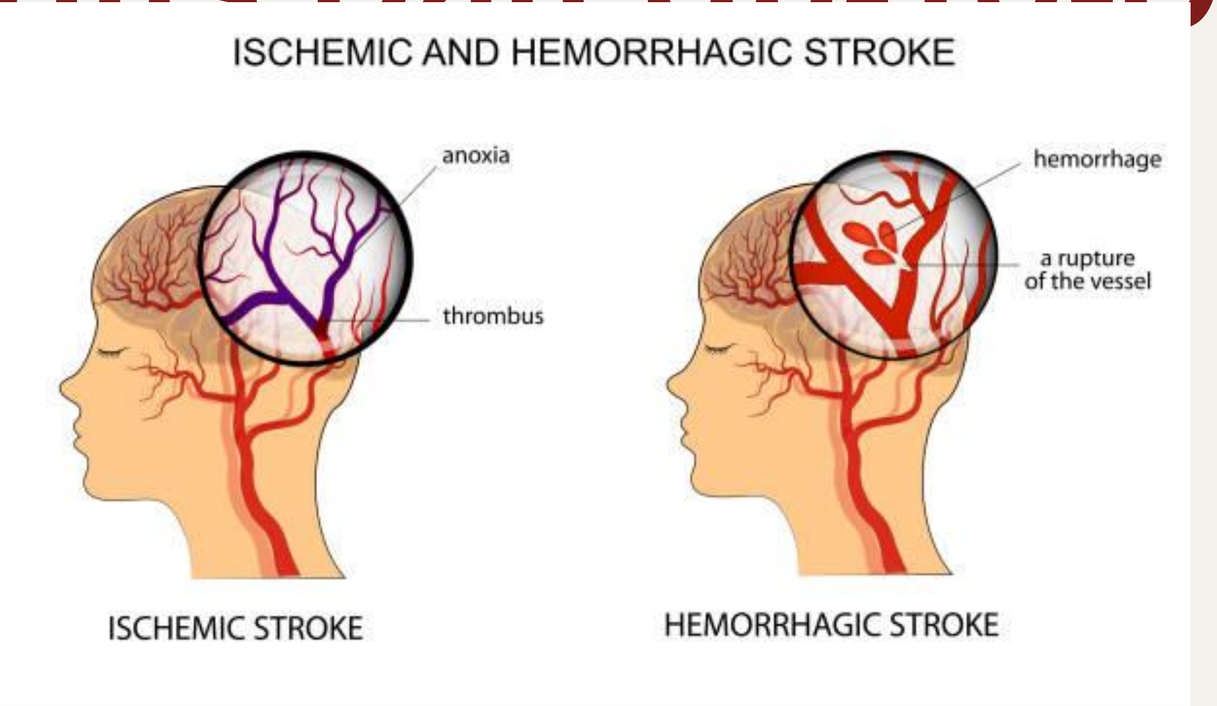
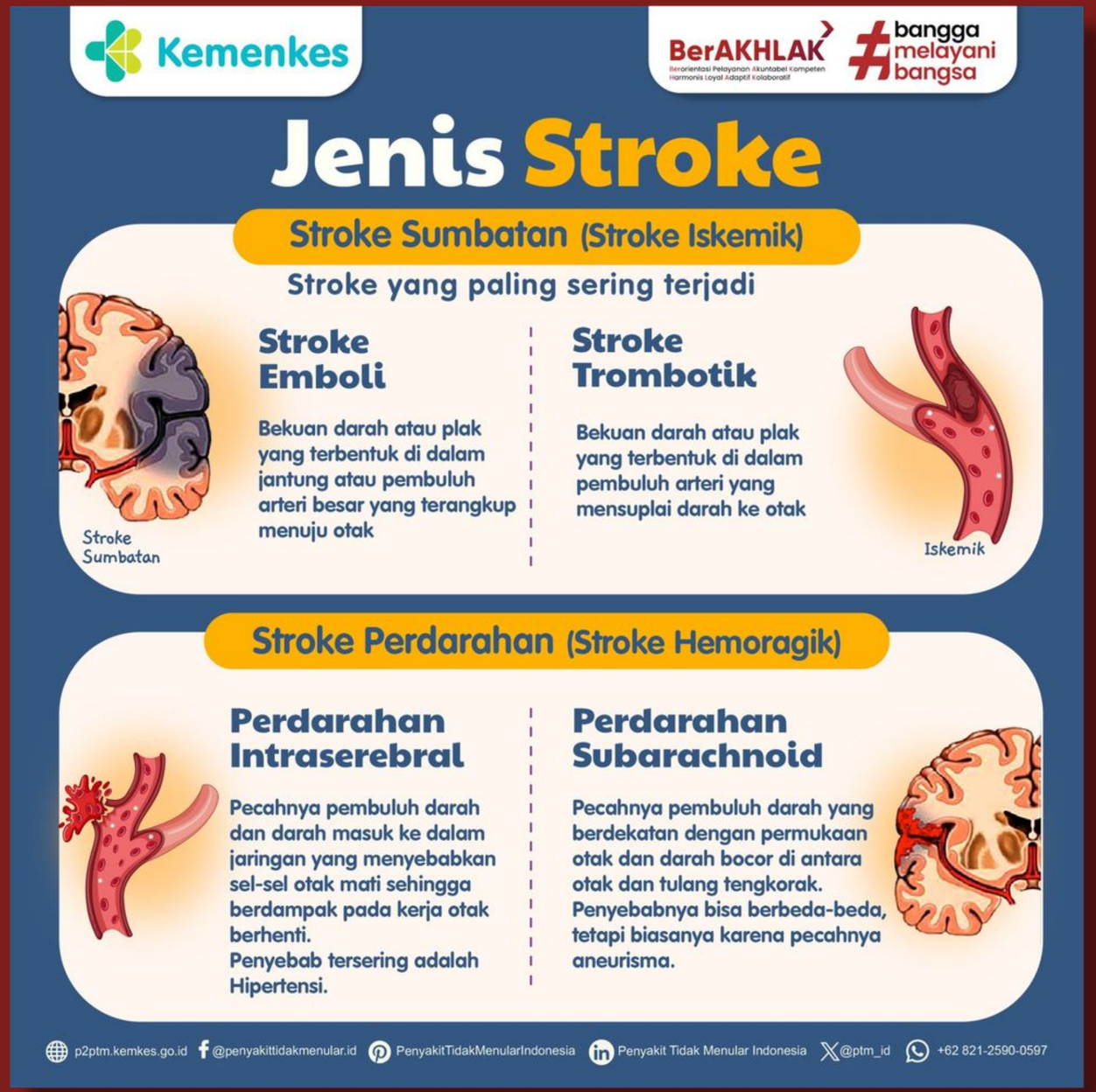
BAGIAN I

Memahami Stroke Secara Kritis Dan Up-To-Date



Klasifikasi Stroke

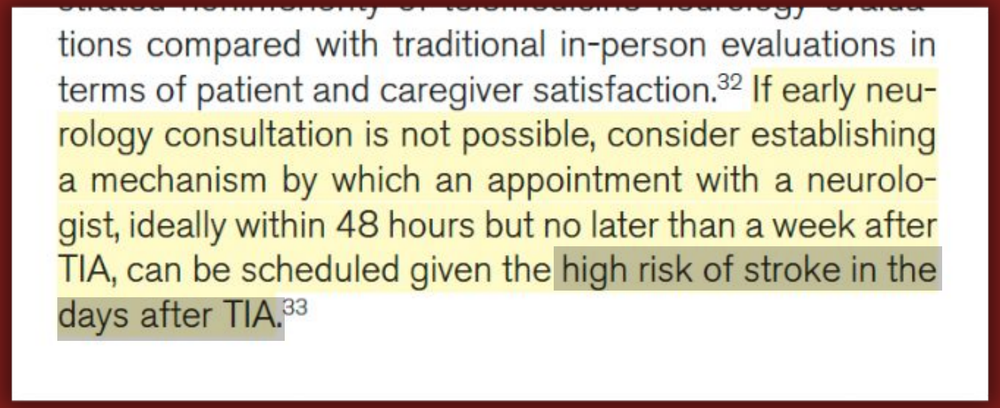
: Apa yang Harus Selalu Kita Ingat?



"Implikasi terapi yang sangat berbeda"

Klasifikasi Stroke: Apa yang Harus Selalu Kita Ingat?

"TIA sebagai medical emergency yang sering diremehkan"



tions compared with traditional in-person evaluations in terms of patient and caregiver satisfaction.[32] If early neurology consultation is not possible, consider establishing a mechanism by which an appointment with a neurologist, ideally within 48 hours but no later than a week after TIA, can be scheduled given the high risk of stroke in the days after TIA.[33]

Amin, H. P., Madsen, T. E., Bravata, D. M., Wira, C. R., Johnston, S. C., Ashcraft, S., ... & Esenwa, C. (2023). Diagnosis, workup, risk reduction of transient ischemic attack in the emergency department setting: a scientific statement from the American Heart Association. Stroke.

Transient Ischemic Attack atau TIA sebagai *Medical Emergency* sering diremehkan sebagai "*stroke ringan*", padahal **risiko stroke berulang** berada pada titik tertinggi dalam **48 jam pertama setelah serangan**

Table 1. Factors Suggestive of TIA Versus TIA Mimic

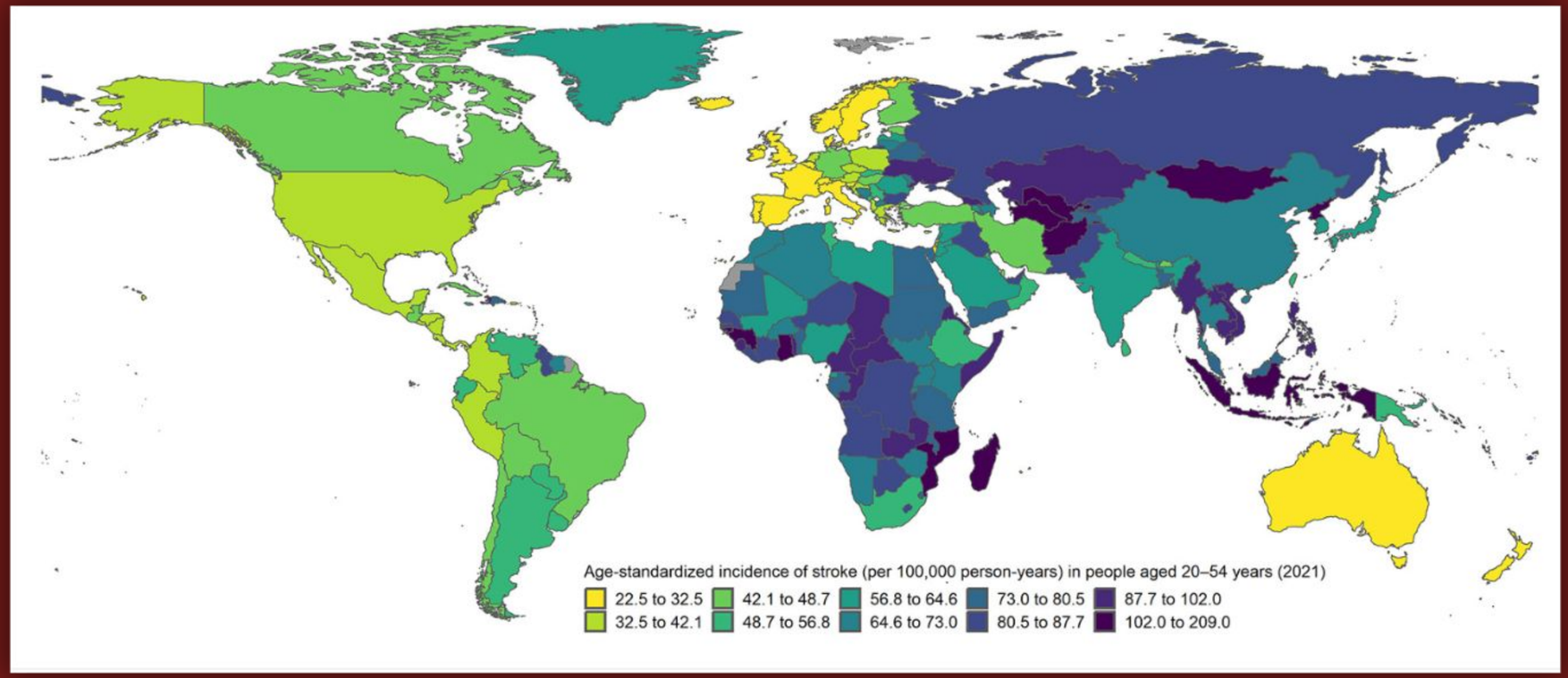
Factors	TIA	TIA mimic
Demographics	Older age	Younger patient without vascular risk factors
Medical history	Presence of vascular risk factors (hypertension, diabetes, coronary artery disease, peripheral artery disease, smoking, obesity, hyperlipidemia, atrial fibrillation, previous stroke, obstructive sleep apnea)	History of epilepsy, migraines, brain tumor
Symptomatology	Abrupt onset Maximal symptoms at onset Duration typically <60 min Preserved mentation Localizing/focal neurological symptoms corresponding to a vascular territory: dysarthria/aphasia, facial droop, hemiparesis, hemibody numbness Dizziness paired with cranial neuropathies, vision loss/diplopia, difficulty with coordination or gait/truncal ataxia, severe nausea/vomiting may suggest posterior circulation process Hypertensive on presentation Headache with ptosis and miosis might indicate dissection	Symptoms that spread/march from site of onset might suggest seizure Altered mentation Migraine headache Presence of signs or symptoms suggesting an alternative diagnosis (ie, positive visual phenomena, seizure-like activity, positional vertigo without localizing/focal symptoms)

This table is meant as a guide to approaching a patient with neurological symptoms and should not be the sole determinant of ultimate diagnosis. Patient-specific factors must also be considered.

TIA indicates transient ischemic attack.

MITOS & MISINFORMASI

"Stroke hanya terjadi pada orang tua"



Nehme, A., & Li, L. (2026). The rising incidence of stroke in the young: Epidemiology, causes and global impact. International Journal of Stroke, 21(1), 14-23.

Distribusi Global Insidensi Stroke Usia 20–54 Tahun (2021) Asia dan Afrika menunjukkan beban kasus tertinggi pada usia produktif, menekankan urgensi pencegahan dini

MITOS & MISINFORMASI

"Stroke hanya terjadi pada orang tua"

	Patient characteristics	Clinical features	Diagnostic features
Large artery atherosclerosis			
Atherosclerotic arteriopathy	Age range: often 40–49 years; sex: both; ethnicity: all	History of cardiovascular disease and presence of traditional risk factors (eg, smoking, obesity, hypercholesterolemia, diabetes)	Duplex or angiography or transcranial Doppler: stenosis of large vessels at typical sites (eg, carotid bifurcation, carotid siphon, middle cerebral artery)

Hipertensi tidak terkontrol pada usia produktif **meningkatkan risiko stroke iskemik**. Prevalensi hipertensi dan faktor risiko lain seperti merokok dan obesitas terus meningkat

Stroke of other determined cause			
Antiphospholipid syndrome	Age range: all; sex: women more than men (5:1); ethnicity: all	History of arterial or venous thrombosis and history of pregnancy complications (eg, ≥3 miscarriages, intrauterine death, premature birth due to high blood pressure, pre-eclampsia, HELLP syndrome or placenta failure)	Laboratory: positive antiphospholipid antibodies (lupus anticoagulants, beta-2 glycoprotein, and anticardiolipin antibodies) at two different timepoints with at least a 12-week interval

Trombofilia terutama sindrom antifosfolipid, adalah **faktor risiko penting stroke** pada dewasa muda, ditandai dengan riwayat trombosis dan komplikasi kehamilan.

Ekker, M. S., Boot, E. M., Singhal, A. B., Tan, K. S., Debette, S., Tuladhar, A. M., & de Leeuw, F. E. (2018). Epidemiology, aetiology, and management of ischaemic stroke in young adults. The Lancet Neurology, 17(9), 790-801.

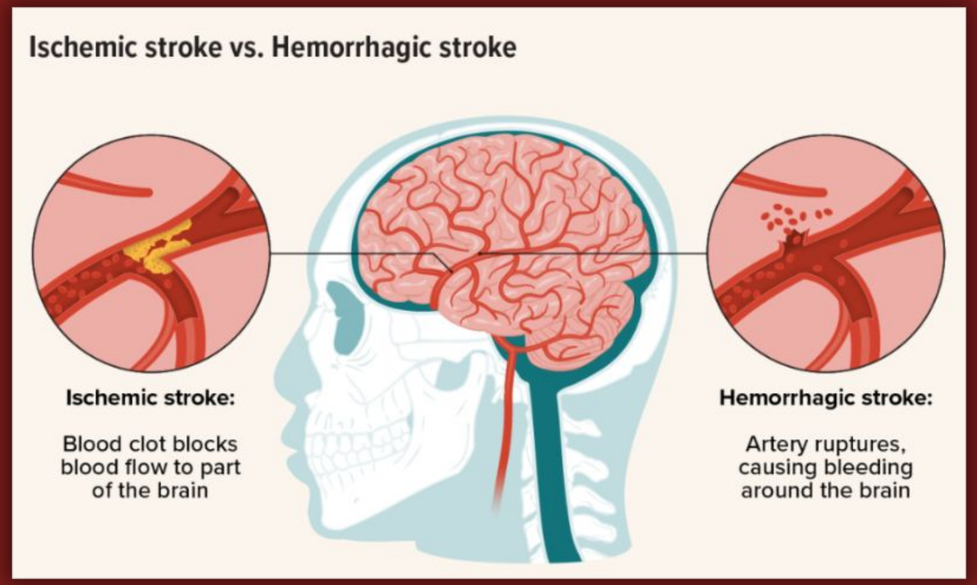
Cervical artery dissection (CAD) and Patent Foramen Ovale (PFO) represent important causes of stroke in young and middle-aged patients [1]. The etiology of spontaneous extra and/or intra cranial arterial dissection is considered multifactorial. Vessel wall weakness is probably present in patients with spontaneous dissection who are also more predisposed to suffer from intracranial aneurysm [2], aortic root dilatation [3], and arterial

PFO Sering dikaitkan dengan **stroke kriptogenik** (stroke yang tidak diketahui penyebabnya) sedangkan **CAD** sebagai satu penyebab utama **stroke** pada pasien muda, sering kali **dipicu** oleh **trauma** ringan atau **cedera olahraga**

Arcadi, F. A., Morabito, R., Marino, S., Formica, C., & Calabrò, R. S. (2023). Cervical artery dissection and patent foramen ovale in juvenile stroke: causality or casuality? A familiar case report. Medical Sciences, 11(2), 34.

MITOS & MISINFORMASI

"Semua stroke harus diberi obat pengencer darah"



“Pada stroke hemoragik, pembuluh darah di otak pecah dan bocor. Jika diberi obat pengencer darah, luka tersebut tidak bisa tertutup karena kemampuan alami darah untuk membeku telah hilang. Akibatnya, pendarahan meluap tanpa henti, menekan otak, dan bisa menyebabkan kematian seketika”

MITOS & MISINFORMASI

"Semua stroke harus diberi obat pengencer darah"

Mengapa bisa demikian??

Multiple randomized clinical trials performed several decades ago found that anticoagulant therapy lowered the risk of ischemic stroke after acute MI compared with antiplatelet therapy.[16] These trials were performed before the widespread use of coronary stents and dual antiplatelet therapy, and it is becom-

Cozza, E., Cito, V., Giumbini, G., Marsili, G., Barletta, M., Zannoni, J., ... & Tusa, M. (2026). Cardioembolic sources and stroke prevention: a systematic review. Cardiovascular Ultrasound, 24(1), 8.

Pada **stroke kardioemboli** akibat AF, darah yang menggenang di jantung membentuk **gumpalan** yang didominasi oleh **fibrin**, **bukan keping darah.**

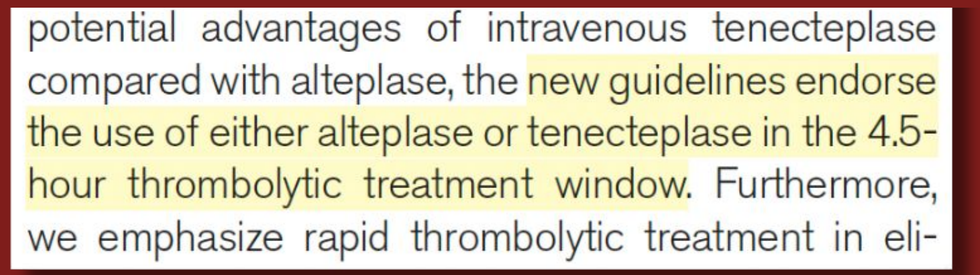
Aspirin monoterapi **tidak efektif** untuk **pencegahan stroke** pada pasien dengan **fibrilasi atrium**, dan DAPT aspirin-clopidogrel memiliki efikasi terbatas pada kondisi ini **antikoagulan tetap menjadi pilihan utama**

BAGIAN II

UPDATE TERAPI AKUT STROKE — APA YANG BARU?

Trombolisis: Paradigma "Time is Brain" Bertemu "Tissue is Brain”

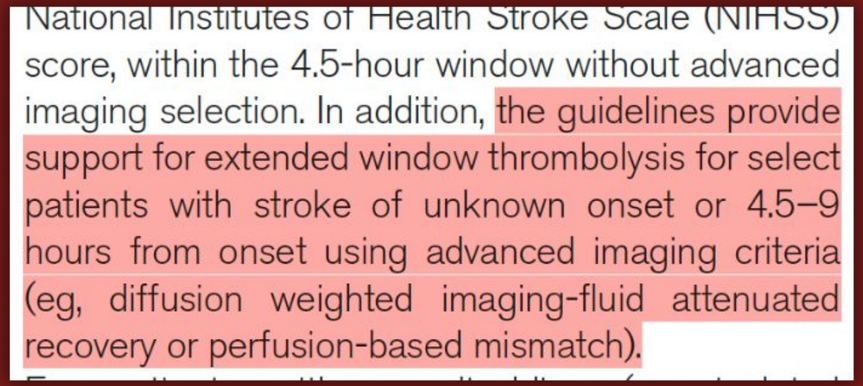
“waktu memang penting, tetapi kondisi jaringan adalah penentu utama”


potential advantages of intravenous tenecteplase compared with alteplase, the new guidelines endorse the use of either alteplase or tenecteplase in the 4.5-hour thrombolytic treatment window. Furthermore, we emphasize rapid thrombolytic treatment in eli-

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

Dahulu, batasan **0–4,5 jam** (T*ime is Brain*) adalah harga mati untuk memberikan **Alteplase**. Jika lewat satu menit saja, pasien kehilangan kesempatan terapi.

Namun, **panduan terbaru 2026 AHA/ASA** menunjukkan pergeseran ke "*Tissue is Brain*": Pasien dengan onset 4,5–9 jam atau onset tidak diketahui (misal: wake-up stroke) kini tetap bisa mendapatkan trombolisis.


National Institutes of Health Stroke Scale (NIHSS) score, within the 4.5-hour window without advanced imaging selection. In addition, the guidelines provide support for extended window thrombolysis for select patients with stroke of unknown onset or 4.5–9 hours from onset using advanced imaging criteria (eg, diffusion weighted imaging-fluid attenuated recovery or perfusion-based mismatch).

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

Trombolisis: Paradigma "Time is Brain" Bertemu "Tissue is Brain”

“waktu memang penting, tetapi kondisi jaringan adalah penentu utama”

tration, thus potentially reducing the potential for dosing errors and treatment delays. Tenecteplase’s 1-time bolus approach may streamline workflows in settings where timely therapy is crucial, potentially shortening DTN and DIDO times.[10] Real-world data and patient level pooled meta-analyses may help clarify whether any clinical differences

Tenecteplase diberikan sebagai injeksi tunggal tanpa infusi selama satu jam, sehingga menyederhanakan penatalaksanaan dan memfasilitasi transfer pasien yang lebih cepat antar fasilitas

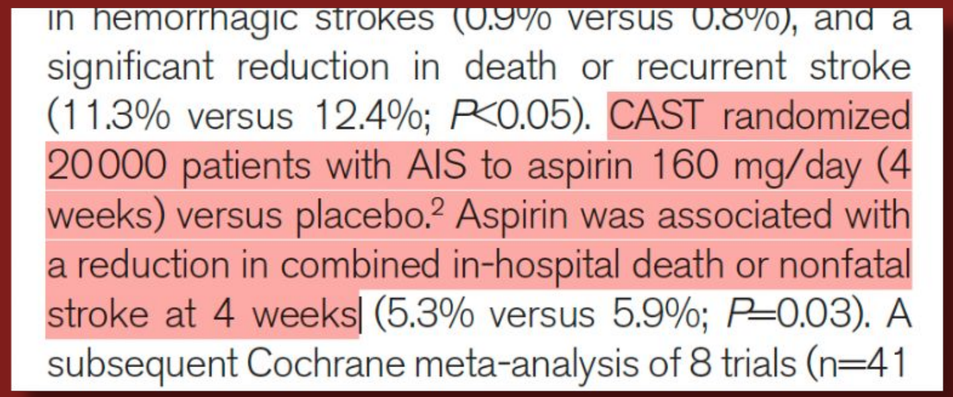
Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

7.2%]).[9] Current evidence from multiple large trials supports using a 0.25 mg/kg dose of tenecteplase, which has demonstrated a more favorable safety and efficacy profile. Therefore, administering tenecteplase at 0.4 mg/kg is not recommended for patients with AIS presenting within 4.5 hours of symptom onset.[6–9]

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

MITOS & MISINFORMASI

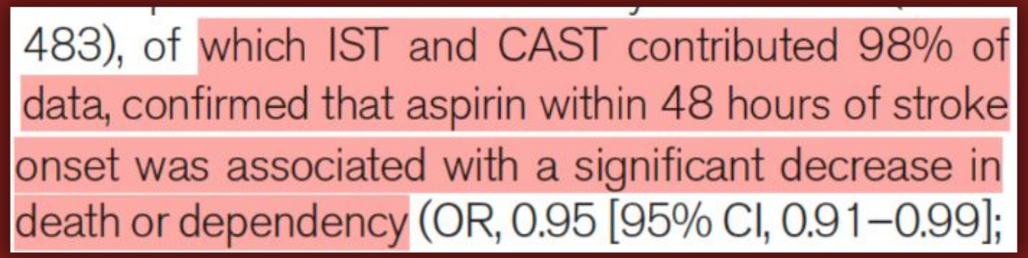
"Jika pasien sudah dapat antiplatelet rutin, tidak perlu loading dose saat stroke akut"



in hemorrhagic strokes (0.9% versus 0.8%), and a significant reduction in death or recurrent stroke (11.3% versus 12.4%; $P<0.05$). CAST randomized 20 000 patients with AIS to aspirin 160 mg/day (4 weeks) versus placebo.[2] Aspirin was associated with a reduction in combined in-hospital death or nonfatal stroke at 4 weeks (5.3% versus 5.9%; $P=0.03$). A subsequent Cochrane meta-analysis of 8 trials (n=41

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

Loading dose (160–325 mg) diperlukan untuk **memastikan inhibisi trombosit terjadi secara maksimal** guna mencegah perluasan sumbatan



483), of which IST and CAST contributed 98% of data, confirmed that aspirin within 48 hours of stroke onset was associated with a significant decrease in death or dependency (OR, 0.95 [95% CI, 0.91–0.99];

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

Pemberian Aspirin dalam 24–48 jam pertama setelah onset stroke iskemik secara signifikan menurunkan risiko stroke berulang dini dan angka kematian. **Menunda dosis atau hanya memberikan dosis kecil berarti membiarkan "celah" risiko tetap terbuka**

MITOS & MISINFORMASI

"Jika pasien sudah dapat antiplatelet rutin, tidak perlu loading dose saat stroke akut"

Bagaimana Jika Pasien Sudah "***On-Clopidogrel***"?

MITOS & MISINFORMASI

"Jika pasien sudah dapat antiplatelet rutin, tidak perlu loading dose saat stroke akut"

Bagaimana Jika Pasien Sudah "***On-Clopidogrel***"?

“Strategi Eskalasi **Dual Antiplatelet Therapy** (DAPT)”

DAPT Pada Fase Akut: Kapan, Berapa Lama, dan Untuk Siapa?

4.8. Antiplatelet Treatment	COR 2a. In patients with minor (NIHSS score ≤5) noncardioembolic AIS or high-risk TIA ($ABCD^2$ score ≥4) within 24 to 72 hours from stroke onset, or NIHSS score of 4 to 5 within 24 hours from onset, who did not receive IVT, with presumed atherosclerotic cause (≥50% stenosis of intracranial or extracranial stenosis that was likely to have accounted for clinical presentation or acute new infarctions on imaging of presumed large artery atherosclerosis origin), DAPT (clopidogrel and aspirin) for 21 days followed by SAPT is reasonable to reduce the 90-day risk of recurrent stroke.

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

DAPT dengan **clopidogrel dan aspirin** diindikasikan untuk waktu singkat (21 hari) setelah **stroke iskemik akut minor** atau **TIA risiko tinggi**

Pada pasien stroke iskemik ringan atau TIA risiko tinggi yang diduga akibat aterosklerosis, kombinasi **clopidogrel-aspirin** yang dimulai dalam **72 jam** setelah onset stroke

This post hoc subgroup analysis of the INSPIRES trial found that among patients with acute mild ischemic stroke or high-risk TIA, the efficacy of dual antiplatelet treatment with clopidogrel-aspirin initiated within 72 hours after symptom onset was superior to aspirin alone in reducing the risk of subsequent stroke only in those with a low level of risk profile (ESRS <3), with no further increase in the risk of moderate-to-severe bleeding events. Risk profile should be considered when prescribing clopidogrel-aspirin therapy to these patients.

Zhang, Y., Wang, X., Gao, Y., Chen, W., Johnston, S. C., Amarenco, P., ... & Pan, Y. (2025). Dual antiplatelet treatment up to 72 hours after ischemic stroke stratified by risk profile: a post hoc analysis. Stroke, 56(1), 46-55.

MITOS & MISINFORMASI

“DAPT harus dilanjutkan seumur hidup setelah stroke”

(b) Duration of DAPT: The duration of ASA+CLO therapy was 21 days in CHANCE and 90 days in POINT. However, the benefit of DAPT over aspirin was variable during the 90-day period. A meta-analysis of the FASTER, CHANCE, and POINT trials showed that most of the benefits of DAPT occurred within 10 days of randomization [22]. A patient-level meta-analysis of the CHANCE and POINT trials confirmed that the benefit of DAPT occurred mainly within the first 21 days [23]. Furthermore, a meta-analysis including short-term trials such as CHANCE and POINT and long-term trials such as SPS3 and CHARISMA revealed that short-term DAPT for up to 1 month was associated with significant reductions in ischemic stroke and vascular events; intermediate-term DAPT for up to 3 months was associated not only with significant reductions in ischemic stroke and vascular events but also a significant increase in major bleeding; whereas, long-term DAPT over 3 months was associated with significant increases in both major bleeding and mortality and no significant reductions in ischemic stroke or major vascular events [24].

Chan, B. P., Wong, L. Y., Tan, B. Y., Yeo, L. L., & Venketasubramanian, N. (2024). Dual antiplatelet therapy for the acute management and long-term secondary prevention of ischemic stroke and transient ischemic attack, an updated review. Journal of cardiovascular development and disease, 11(2), 48.

Penggunaan DAPT aspirin-clopidogrel **melebihi 90 hari** setelah stroke tidak direkomendasikan karena peningkatan **risiko perdarahan intrakranial** dan **perdarahan mayor**

Transisi ke monoterapi: Kapan dan Bagaimana?

therapy, and there have been ongoing debates on the optimal duration of DAPT after percutaneous coronary intervention (PCI).[4,5] Recently, a very short (1–3 months) durations of DAPT followed by P2Y12 inhibitor monotherapy has been demonstrated to reduce bleeding events without increase in cardiovascular events compared with standard durations of DAPT.[6–10] In the SIDNEY-2 (Assessment of Efficacy and Safety of Thioctic Acid in the Oral Treatment of Symptomatic Diabetic Neuropathy) collaborative individual patient-level meta-

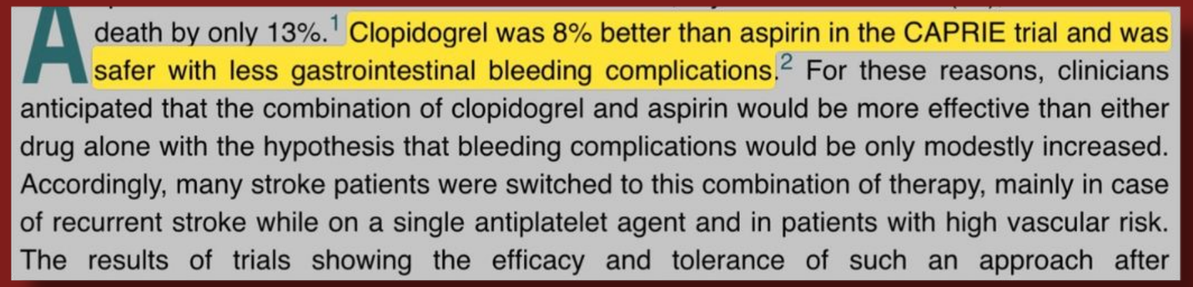
Natsuaki, M., Watanabe, H., Morimoto, T., Yamamoto, K., Obayashi, Y., Nishikawa, R., ... & Kimura, T. (2024). An aspirin-free versus dual antiplatelet strategy for coronary stenting: STOPDAPT-3 randomized trial. Circulation, 149(8), 585-600.

Durasi DAPT yang singkat (~90 hari) yang kemudian dilanjutkan dengan **monoterapi inhibitor P2Y12** telah terbukti dapat mengurangi kejadian perdarahan tanpa meningkatkan kejadian kardiovaskular .

MITOS & MISINFORMASI

“Aspirin dan Clopidogrel Sama Saja — Pilih yang Lebih Murah”

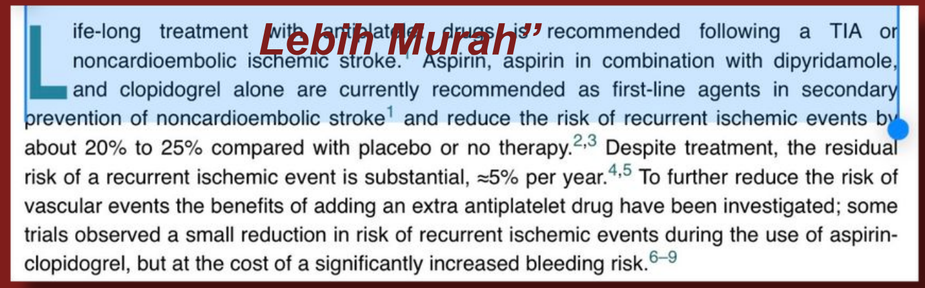
Kapan memilih Clopidogrel vs Aspirin (monoterapi)?



death by only 13%.[1] Clopidogrel was 8% better than aspirin in the CAPRIE trial and was safer with less gastrointestinal bleeding complications.[2] For these reasons, clinicians anticipated that the combination of clopidogrel and aspirin would be more effective than either drug alone with the hypothesis that bleeding complications would be only modestly increased. Accordingly, many stroke patients were switched to this combination of therapy, mainly in case of recurrent stroke while on a single antiplatelet agent and in patients with high vascular risk. The results of trials showing the efficacy and tolerance of such an approach after

Amarenco, P., & Donnan, G. A. (2004). Should the MATCH results be extrapolated to all stroke patients and affect ongoing trials evaluating clopidogrel plus aspirin?. Stroke, 35(11), 2606-2608.

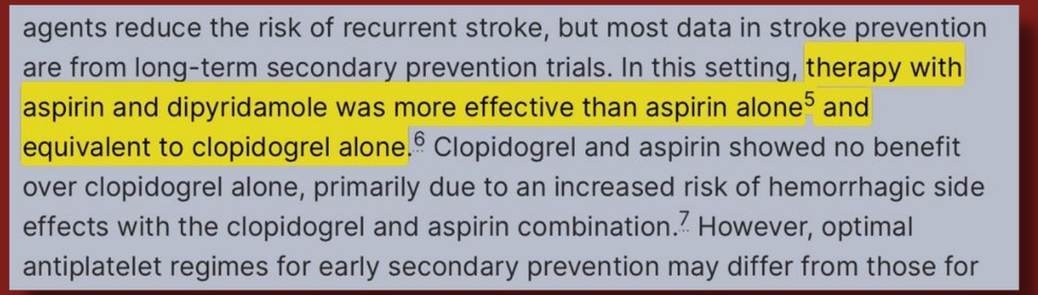
Clopidogrel lebih baik dibandingkan dengan aspirin untuk pasien dengan riwayat stroke/TIA sebelumnya berdasarkan trial CAPRIE



ife-long treatment with antiplatelet drugs is recommended following a TIA or noncardioembolic ischemic stroke.[1] Aspirin, aspirin in combination with dipyridamole, and clopidogrel alone are currently recommended as first-line agents in secondary prevention of noncardioembolic stroke[1] and reduce the risk of recurrent ischemic events by about 20% to 25% compared with placebo or no therapy.[2,3] Despite treatment, the residual risk of a recurrent ischemic event is substantial, ≈5% per year.[4,5] To further reduce the risk of vascular events the benefits of adding an extra antiplatelet drug have been investigated; some trials observed a small reduction in risk of recurrent ischemic events during the use of aspirin-clopidogrel, but at the cost of a significantly increased bleeding risk.[6–9]

Hilkens, N. A., Algra, A., Diener, H. C., Bath, P. M., Csiba, L., Hacke, W., ... & Greving, J. P. (2021). Balancing benefits and risks of long-term antiplatelet therapy in noncardioembolic transient ischemic attack or stroke. Stroke.

Aspirin, kombinasi aspirin + dipiridamol, serta clopidogrel saat ini direkomendasikan sebagai **agen lini pertama** dalam pencegahan sekunder stroke.

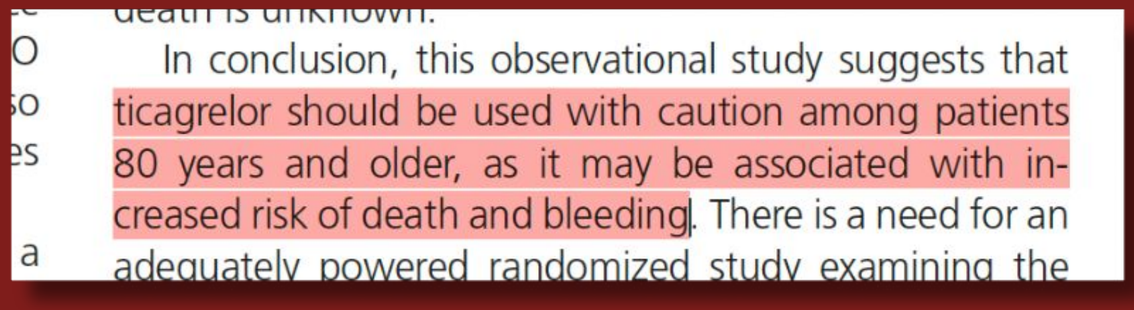


agents reduce the risk of recurrent stroke, but most data in stroke prevention are from long-term secondary prevention trials. In this setting, therapy with aspirin and dipyridamole was more effective than aspirin alone[5] and equivalent to clopidogrel alone.[6] Clopidogrel and aspirin showed no benefit over clopidogrel alone, primarily due to an increased risk of hemorrhagic side effects with the clopidogrel and aspirin combination.[7] However, optimal antiplatelet regimes for early secondary prevention may differ from those for

Terapi dengan aspirin + dipiridamol lebih efektif dibandingkan aspirin tunggal dan memiliki efektivitas yang setara dengan clopidogrel tunggal.

MITOS & MISINFORMASI

Kapan memilih Ticagrelor vs Clopidogrel?



death is unknown.

In conclusion, this observational study suggests that ticagrelor should be used with caution among patients 80 years and older, as it may be associated with increased risk of death and bleeding. There is a need for an adequately powered randomized study examining the

Szummer, K., Montez-Rath, M. E., Alfredsson, J., Erlinge, D., Lindahl, B., Hofmann, R., ... & Jernberg, T. (2020). Comparison between ticagrelor and clopidogrel in elderly patients with an acute coronary syndrome: insights from the SWEDEHEART registry. Circulation, 142(18), 1700-1708.

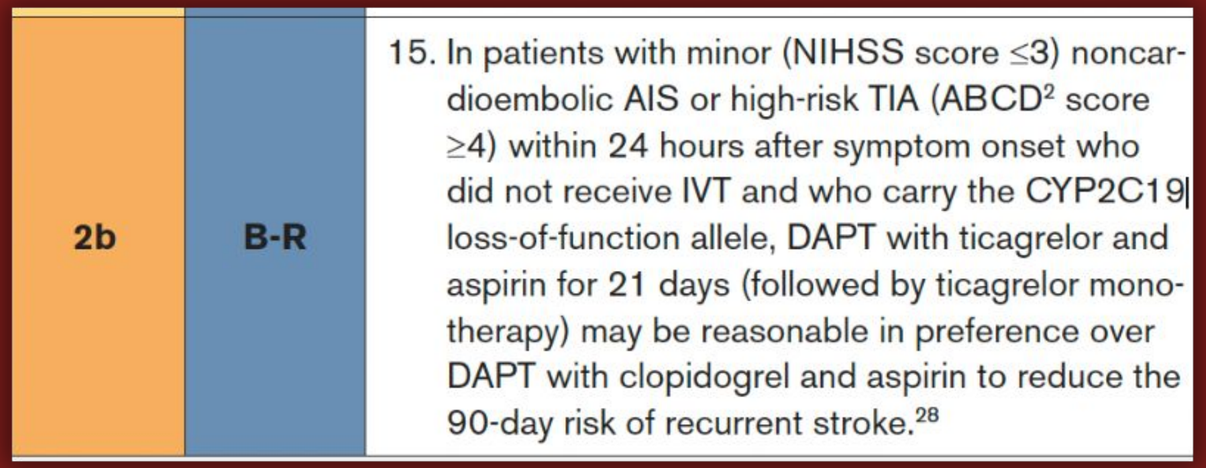
Pada **pasien < 80 Tahun Ticagrelor sangat efektif.** Obat ini menurunkan risiko kematian, serangan jantung, dan stroke secara signifikan **dibandingkan Clopidogre**l.

Namun pada **Pasien ≥ 80 tahun manfaatnya hilang**. **Tidak ada perbedaan** signifikan pada hasil akhir iskemik (kematian/serangan jantung/stroke) secara keseluruhan **dibandingkan Clopidogrel.**

MITOS & MISINFORMASI

Kapan memilih Ticagrelor vs Clopidogrel?

Pada stroke iskemik minor dan TIA risiko tinggi, kombinasi aspirin-clopidogrel kini direkomendasikan untuk pengobatan jangka pendek akut, sedangkan kombinasi aspirin-ticagrelor dapat dipertimbangkan pada pasien tertentu terutama yang mengalami resistensi terhadap clopidogrel



2b	B-R	15. In patients with minor (NIHSS score ≤3) noncardioembolic AIS or high-risk TIA (ABCD² score ≥4) within 24 hours after symptom onset who did not receive IVT and who carry the CYP2C19 loss-of-function allele, DAPT with ticagrelor and aspirin for 21 days (followed by ticagrelor monotherapy) may be reasonable in preference over DAPT with clopidogrel and aspirin to reduce the 90-day risk of recurrent stroke.[28]

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

MITOS & MISINFORMASI

Kapan memilih Ticagrelor vs Clopidogrel?

Table 9. DAPT Trials

AIS DAPT trial	Inclusion	Drug/duration	LKN	NNT
CHANCE[19]	AIS (NIHSS ≤3) or TIA (ABCD ≥4)	Clopidogrel (300 mg load then 75 mg/d) + Asa (75 mg) x 21 d followed by clopidogrel	24 h	28
POINT*[21]	AIS (NIHSS ≤3) or TIA (ABCD ≥4)	Clopidogrel (600 mg load then 75 mg/d) + Asa (50–325 mg/d) x 90 d	12 h	67
THALES*[26]	AIS (NIHSS ≤5) or TIA (ABCD ≥6)	Ticagrelor (180 mg load then 90 mg twice daily) + Asa (300–325 mg load then 75–100 mg/d) x 30 d	24 h	91
CHANCE 2*[28]	AIS (NIHSS ≤3) or TIA (ABCD ≥4) and CYP2C19 loss-of-function allele	Ticagrelor (180 mg load then 90 mg twice daily) + Asa (75–300 mg load then 75mg/d) x 21 d followed by ticagrelor	24 h	63
INSPIRES*[27]	AIS (NIHSS ≤5) or TIA (ABCD ≥4), presumed athero	Clopidogrel (300 mg load then 75 mg/d) + Asa (100–300 mg load then 100mg/d) x 21 d followed by clopidogrel	72 h	53

Prabhakaran, S., Gonzalez, N. R., Zachrison, K. S., Adeoye, O., Alexandrov, A. W., Ansari, S. A., ... & Yaghi, S. (2026). 2026 Guideline for the early management of patients with acute ischemic stroke: a guideline from the American Heart Association/American Stroke Association. Stroke.

“Untuk pasien stroke yang secara genetik atau klinis tidak mempan dengan Clopidogrel, Ticagrelor adalah pilihan yang lebih baik dan lebih aman secara proporsional”

BAGIAN III

Pencegahan Sekunder : Update Evidence & Klarifikasi Mitos

Manajemen Tekanan Darah Pasca Stroke

MITOS & MISINFORMASI:
"Tekanan darah tinggi pasca stroke akut harus langsung diturunkan agresif"

Fenomena autoregulasi otak pasca stroke
Menurunkan TD terlalu cepat bisa memperluas infark

2. Patients with AIS can present with severe acute comorbidities, such as acute heart failure and aortic dissection, which require emergency BP reduction to prevent worsening of these conditions or SAE. Excessive BP lowering, however, can lead to exacerbation of cerebral ischemia[24] in the setting of impaired cerebral autoregulation. Individualized management balancing cerebral and other systemic organ perfusion is recommended with an initial BP reduction of 15%.

American Heart Association, & American Stroke Association. (2026). *2026 Guideline For The Early Management of Patients with Acute Ischemic Stroke. Stroke*, 57, e1–e96.

Pada stroke iskemik akut, **tekanan darah tidak boleh langsung diturunkan secara agresif** karena penurunan berlebihan dapat memperberat iskemia serebral akibat **gangguan autoregulasi otak.**

Manajemen Tekanan Darah Pasca Stroke

MITOS & MISINFORMASI:
"Tekanan darah tinggi pasca stroke akut harus langsung diturunkan agresif"

Target TD pada fase akut (0–24 jam)
Biarkan hingga 220/120 mmHg pada non-trombolisis; <185/110 mmHg sebelum trombolisis

2b	C-EO	3. In patients with BP ≥220/120 mm Hg who did not receive IVT or EVT and have no comorbid conditions requiring urgent antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the first 48 to 72 hours is uncertain.

American Heart Association, & American Stroke Association. (2026). ***2026 Guideline For The Early Management of Patients with Acute Ischemic Stroke. Stroke***, 57, e1–e96.

- Pada pasien **AIS tanpa IVT atau EVT**: TD toleran hingga 220/120 mmHg pada 24 jam pertama untuk menjaga perfusi serebral.
- Pada pasien **AIS yang akan menjalani IVT atau EVT**: TD harus <185/110 mmHg untuk mengurangi risiko perdarahan.

AIS: *Acute Ischemic Stroke;* IVT: *Intravenous Thrombolysis*; EVT: *Endovascular Thrombectomy*

Manajemen Tekanan Darah Pasca Stroke

MITOS & MISINFORMASI:
"Tekanan darah tinggi pasca stroke akut harus langsung diturunkan agresif"

Target TD jangka panjang

<130/80 mmHg untuk pencegahan sekunder

1	B-R	2. In patients with hypertension who experience a stroke or TIA, an office BP goal of <130/80 mm Hg is recommended for most patients to reduce the risk of recurrent stroke and vascular events.[185,190–194]

American Heart Association, & American Stroke Association. (2021). 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack. Stroke, 52(7), e364–e467.

Pada **pencegahan stroke sekunder**, target tekanan darah jangka panjang yang direkomendasikan adalah **<130/80 mmHg**.

TIA: *Transient Ischemic Attack*

Manajemen Tekanan Darah Pasca Stroke

MITOS & MISINFORMASI:
"Tekanan darah tinggi pasca stroke akut harus langsung diturunkan agresif"

Pemilihan antihipertensi

ACEi/ARB + diuretik tiazid sebagai pilihan utama

Recommendations for Hypertension
Referenced studies that support recommendations are summarized in online Data Supplements 11 and 12.

COR	LOE	Recommendations
1	A	1. In patients with hypertension who experience a stroke or TIA, treatment with a thiazide diuretic, angiotensin-converting enzyme inhibitor, or angiotensin II receptor blockers is useful for lowering BP and reducing recurrent stroke risk.[185–189]

American Heart Association, & American Stroke Association. (2021). 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack. Stroke, 52(7), e364–e467.

ACEi/ARB dan atau **diuretik tiazid** merupakan pilihan utama untuk kontrol tekanan darah pada pencegahan sekunder stroke.

Statin: Lebih dari Sekadar Menurunkan Kolesterol

Efek pleiotropik statin pada stabilisasi plak aterosklerotik

MITOS & MISINFORMASI: **"Statin hanya untuk yang**

Recommendations for Lipids		
COR	**LOE**	**Recommendations**
1	A	1. In adults who qualify for treatment with lipid-lowering therapy according to the 2019 ACC/AHA guideline on the primary prevention of CVD (eg, 20–75 years of age with LDL cholesterol [LDL-C] level >190 mg/dL [>4.9 mmol/L], 10-year ASCVD risk ≥20%, or 10-year ASCVD risk ≥7.5%–<20% plus ≥1 risk enhancers), treatment with a statin is recommended to reduce the risk of a first stroke.[243,244]

American Heart Association/American Stroke Association. (2024). ***2024 guideline for the primary prevention of stroke: A guideline from the American Heart Association/American Stroke Association. Stroke,*** 55(12), e344–e424

6.3.2 Statins

Statins exert pleiotropic effects against inflammation. Statins, such as atorvastatin, are widely prescribed as cholesterol-lowering agents but also exhibit significant anti-inflammatory properties that contribute to cardiovascular risk reduction. They work by inhibiting HMG-CoA reductase, the rate-limiting enzyme in cholesterol biosynthesis, which not only reduces lipid levels but also decreases the production of pro-inflammatory cytokines. Statins improve endothelial function and have been shown to stabilize

Bukrinsky, M. I., Ravani, A. L., & Poznyak, A. V. (2026). Targeting inflammation in coronary artery. ***BIOCELL***

Statin juga bersifat **antiinflamasi** dengan **mengurangi produksi sitokin proinflamasi** melalui **inhibisi HMG-CoA reduktase.**

Statin: Lebih dari Sekadar Menurunkan Kolesterol

Target LDL-C pasca stroke aterosklerotik: <70 mg/dL (<55 mg/dL pada risiko sangat tinggi)

1	A	2. In patients with ischemic stroke or TIA and atherosclerotic disease (intracranial, carotid, aortic, or coronary), lipid-lowering therapy with a statin and also ezetimibe, if needed, to a goal LDL-C of <70 mg/dL is recommended to reduce the risk of major cardiovascular events.[210]

American Heart Association, & American Stroke Association. (2021). 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack. ***Stroke***, 52(7), e364–e467.

- AHA/ASA 2021: **<70 mg/dL**
- ESC 2025: **<55 mg/dL (very high risk concept)**

dengan penyakit aterosklerotik, untuk menurunkan kejadian kardiovaskular mayor.

Recommendation Table 1 — Recommendations for cardiovascular risk estimation in persons without known cardiovascular disease (see also Supplementary data online, Evidence Table 1)

Recommendations	Class[a]	Level[b]
SCORE2 is recommended in apparently healthy people <70 years of age without established ASCVD, DM, CKD, genetic/rare lipid or BP disorders for estimation of 10-year fatal and non-fatal CVD risk.[2 c]	I	B
SCORE2-OP is recommended in apparently healthy people ≥70 years of age without established ASCVD, DM, CKD, genetic/rare lipid or BP disorders for estimation of 10-year fatal and non-fatal CVD risk.[3 c]	I	B
Presence of subclinical coronary atherosclerosis by imaging or increased CAC score by CT should be considered as risk modifiers in individuals at moderate risk or individuals around treatment decision thresholds to improve risk classification.[24,27,28,36 d]	IIa	B
Risk modifiers[e] should be considered in individuals at moderate risk or individuals around treatment decision thresholds to improve risk classification.[17,27,37 f]	IIa	B
In primary prevention,[g] pharmacological LDL-C-lowering therapy is recommended in persons: • at very high risk and LDL-C ≥1.8 mmol/L (70 mg/dL), or • at high risk and LDL-C ≥2.6 mmol/L (100 mg/dL) despite optimization of non-pharmacological measures, to lower CVD risk.[1,13,38,39]	I	A
In primary prevention,[g] pharmacological LDL-C-lowering therapy should be considered in persons: • at very high risk and LDL-C ≥1.4 mmol/L (55 mg/dL) but <1.8 mmol/L (70 mg/dL), or • at high risk and LDL-C ≥1.8 mmol/L (70 mg/dL) but <2.6 mmol/L (100 mg/dL), or • at moderate risk and LDL-C ≥2.6 mmol(L (100 mg/dL) but <4.9 mmol/L (190 mg/dL), or • at low risk and LDL-C ≥3.0 mmol/L (116 mg/dL) but <4.9 mmol/L (190 mg/dL) despite optimization of non-pharmacological measures, to lower CVD risk.[1,13,38,39]	IIa	A

© ESC/EAS 2025

European Society of Cardiology & European Atherosclerosis Society. (2025). 2025 focused update of the 2019 ESC/EAS guidelines for the management of dyslipidaemias. ***European Heart Journal***, 46, 4359–4378.

Statin: Lebih dari Sekadar Menurunkan Kolesterol

High-intensity statin (rosuvastatin 20–40 mg atau atorvastatin 40–80 mg) dimulai sesegera mungkin

Tabel 8. Intensitas berbagai jenis dan dosis statin terhadap penurunan LDL-C[147]

Terapi statin intensitas tinggi	Terapi statin intensitas menengah	Terapi statin intensitas rendah
Dosis harian menurunkan LDL-C rata-rata sebesar kurang lebih ≥50%	Dosis harian menurunkan LDL-C rata-rata sebesar kurang lebih 30% hingga <50%	Dosis harian menurunkan LDL-C rata-rata sebesar <30%
Atorvastatin 40-80 mg **Rosuvastatin 20-40 mg**	Atorvastatin 10-20 mg Rosuvastatin 5-10 mg Simvastatin 20-40 mg Pravastatin 40-80 mg Lovastatin 40 mg Fluvastatin XL 80 mg Fluvastatin 40 mg - 2x sehari Pitavastatin 2-4 mg	Simvastatin 10 mg Pravastatin 10-20 mg Lovastatin 20 mg Fluvastatin 20-40 mg Pitavastatin 1 mg

PERKI. (2022). Panduan Tata Laksana Dislipidemia 2022. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskula Indonesia

Pasien yang telah mengalami stroke iskemik atau TIA berisiko untuk kembali terjadinya penyakit aterotrombotik berulang. Pencegahan sekunder dengan statin menurunkan risiko stroke berulang, infark miokard, dan kematian karena penyakit vaskular.

4.3. Treatment of Hyperlipidemia for Secondary Prevention of Stroke

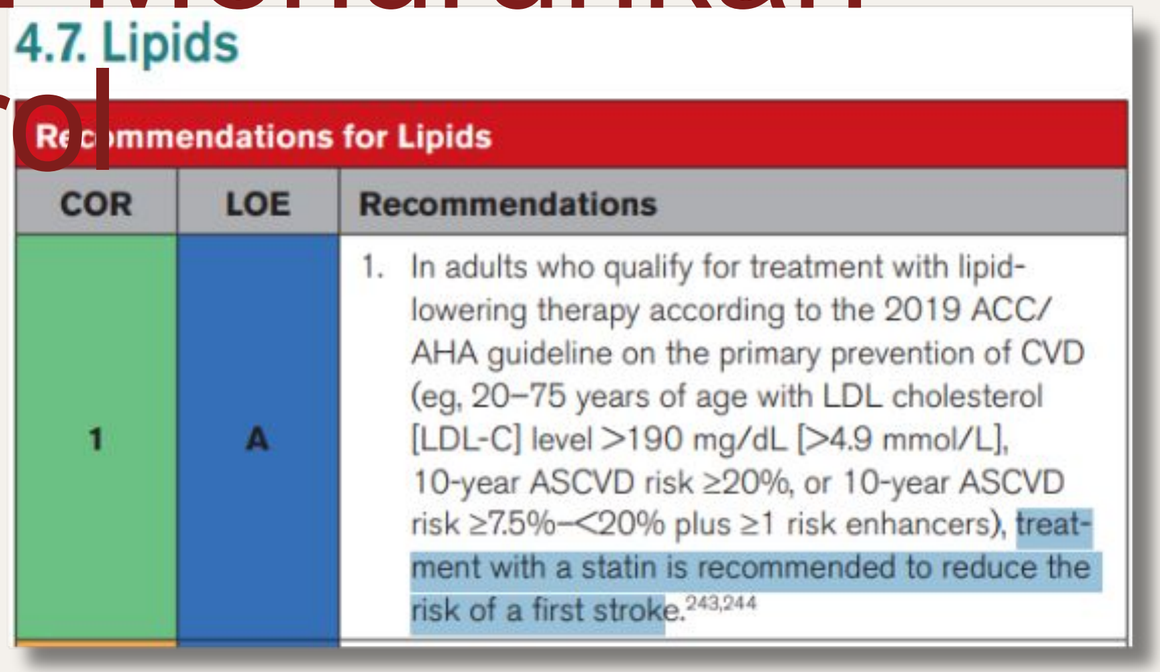
4.3.1. Treatment and Monitoring of Blood Lipids for Secondary Stroke Prevention

Recommendations for Treating and Monitoring Hyperlipidemia
Referenced studies that support recommendations are summarized in online Data Supplement 13.

COR	LOE	Recommendations
		Treatment
1	A	1. In patients with ischemic stroke with no known coronary heart disease, no major cardiac sources of embolism, and LDL cholesterol (LDL-C) >100 mg/dL, atorvastatin 80 mg daily is indicated to reduce risk of stroke recurrence.[208,209]

American Heart Association, & American Stroke Association. (2021). 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack. *Stroke*, 52(7), e364–e467.

Statin: Lebih dari Sekadar Menurunkan Kolesterol



4.7. Lipids

Recommendations for Lipids

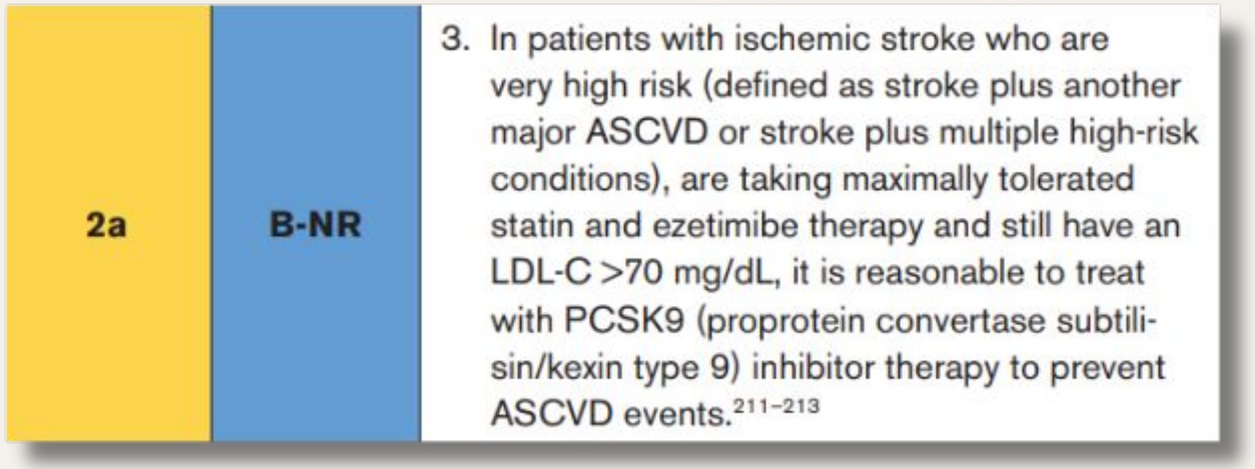
COR	LOE	Recommendations
1	A	1. In adults who qualify for treatment with lipid-lowering therapy according to the 2019 ACC/AHA guideline on the primary prevention of CVD (eg, 20–75 years of age with LDL cholesterol [LDL-C] level >190 mg/dL [>4.9 mmol/L], 10-year ASCVD risk ≥20%, or 10-year ASCVD risk ≥7.5%–<20% plus ≥1 risk enhancers), treatment with a statin is recommended to reduce the risk of a first stroke.[243,244]

American Heart Association/American Stroke Association. (2024). ***2024 guideline for the primary prevention of stroke: A guideline from the American Heart Association/American Stroke Association. Stroke,*** 55(12), e344–e424

Class 1 recommendation (***strong recommendation***) → harus diberikan kecuali ada kontraindikasi.

Statin: Lebih dari Sekadar Menurunkan Kolesterol

Peran PCSK9 inhibitor pada pasien intoleran statin atau target LDL tidak tercapai



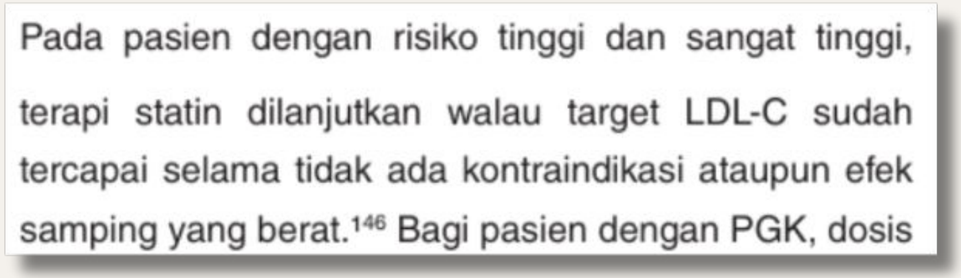
2a	B-NR	3. In patients with ischemic stroke who are very high risk (defined as stroke plus another major ASCVD or stroke plus multiple high-risk conditions), are taking maximally tolerated statin and ezetimibe therapy and still have an LDL-C >70 mg/dL, it is reasonable to treat with PCSK9 (proprotein convertase subtilisin/kexin type 9) inhibitor therapy to prevent ASCVD events.[211–213]

PCSK9 inhibitor dipertimbangkan bila target LDL tidak tercapai dengan statin maksimal, terutama pada pasien risiko sangat tinggi.

American Heart Association, & American Stroke Association. (2021). 2021 guideline for the prevention of stroke in patients with stroke and transient ischemic attack. *Stroke*, 52(7), e364–e467.

Statin: Lebih dari Sekadar Menurunkan Kolesterol

MITOS & MISINFORMASI: **"Statin harus dihentikan selama stroke akut karena berisiko perdarahan"**

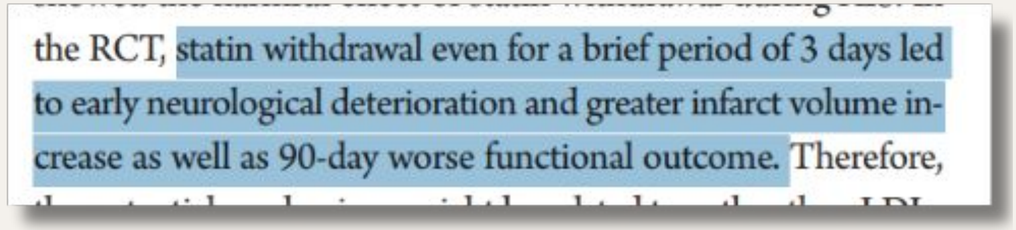


Pada pasien dengan risiko tinggi dan sangat tinggi, terapi statin dilanjutkan walau target LDL-C sudah tercapai selama tidak ada kontraindikasi ataupun efek samping yang berat.[146] Bagi pasien dengan PGK, dosis

PERKI. (2022). Panduan Tata Laksana Dislipidemia 2022. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskula Indonesia

Statin yang sudah berjalan **TIDAK** boleh dihentikan tiba-tiba pada fase akut

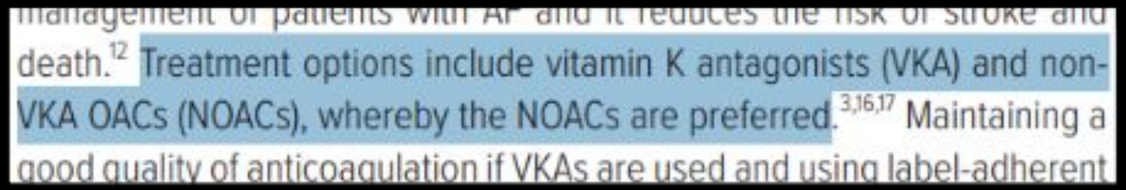
Penghentian mendadak (***statin withdrawal***) terbukti memperburuk outcome neurologi



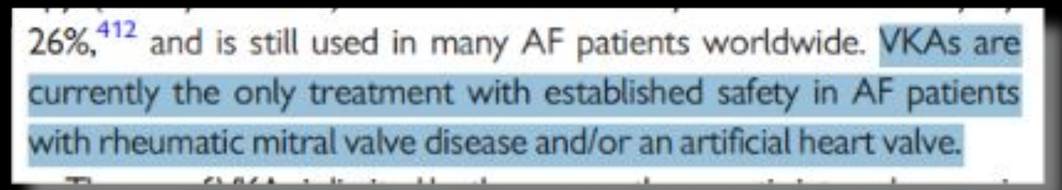
the RCT, statin withdrawal even for a brief period of 3 days led to early neurological deterioration and greater infarct volume increase as well as 90-day worse functional outcome. Therefore,

Hong, S.K., dan Lee, S.J. (2015). Statins in Acute Ischemic Stroke: A Systematic Review . *Journal of Stroke.* 17 (3): 282-301

Antikoagulan pada Stroke Kardioembolik (Atrial Fibrilasi)


management of patients with AF and it reduces the risk of stroke and death.[12] Treatment options include vitamin K antagonists (VKA) and non-VKA OACs (NOACs), whereby the NOACs are preferred.[3,16,17] Maintaining a good quality of anticoagulation if VKAs are used and using label-adherent

ESC. (2020). 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). *European Heart Journal* . 42, 373498


26%,[412] and is still used in many AF patients worldwide. VKAs are currently the only treatment with established safety in AF patients with rheumatic mitral valve disease and/or an artificial heart valve.

ESC. (2020). The 2020 ESC Guidelines on the Diagnosis and Management of Atrial Fibrillation. *Arrhytmia & Electrophysiology Review.*

DOAC lebih direkomendasikan dibanding warfarin pada AF non-valvular karena lebih aman dan praktis. Warfarin tetap digunakan pada mechanical valve dan mitral stenosis berat

DOAC (*Direct Oral Anticoagulants*) yang digunakan:

- apixaban
- rivaroxaban
- dabigatran
- edoxaban

Antikoagulan pada Stroke Kardioembolik (Atrial Fibrilasi)

Kapan memulai antikoagulan setelah stroke akut? — Dilema timing (1-3-6-12 rule)

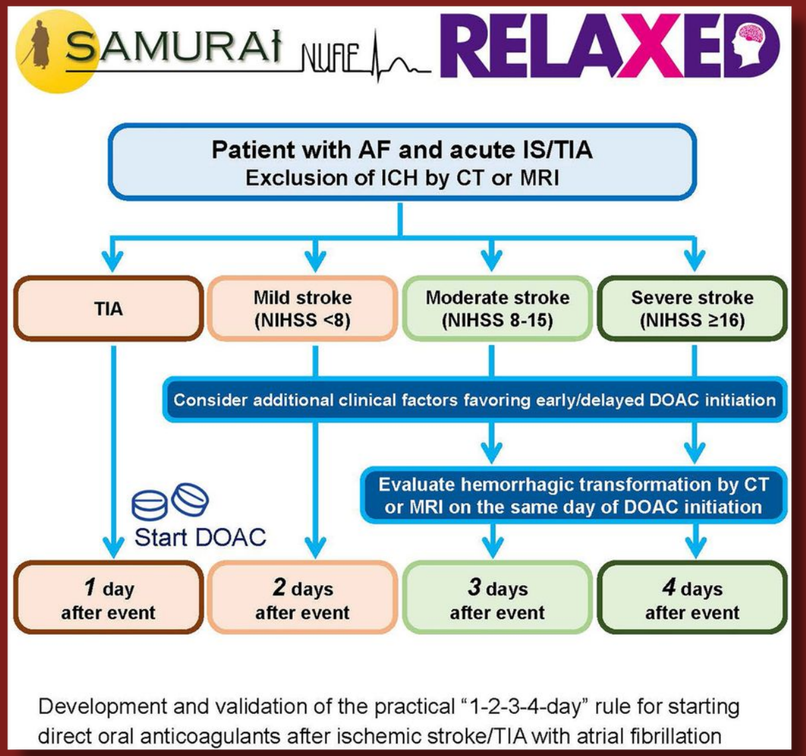
oral anticoagulation after the onset of atrial fibrillation-related ischaemic stroke. The "1–3–6–12 days rule" was introduced in 2013 by the European Heart Rhythm Association of the European Society of Cardiology (EHRA-ESC)[21] because of evidence that large infarcts

Seiffge, J.D., *et al.* (2019). Timing of anticoagulation after recent ischaemic stroke in patients with atrial fibrillation. *Lancet Neurol.* 18(1):117–126.

The "1-3-6-12-day rule" for starting direct oral anticoagulants (DOACs) in patients with nonvalvular atrial fibrillation after acute ischemic stroke or transient ischemic attack recommends timings that may be later than used in clinical practice. We investigated more practical optimal timing of DOAC initiation according to stroke severity.

In Japanese and European populations, early DOAC initiation within 1, 2, 3, or 4 days according to stroke severity seemed to be feasible to decrease the risk of recurrent stroke or systemic embolism and no increase in major bleeding.

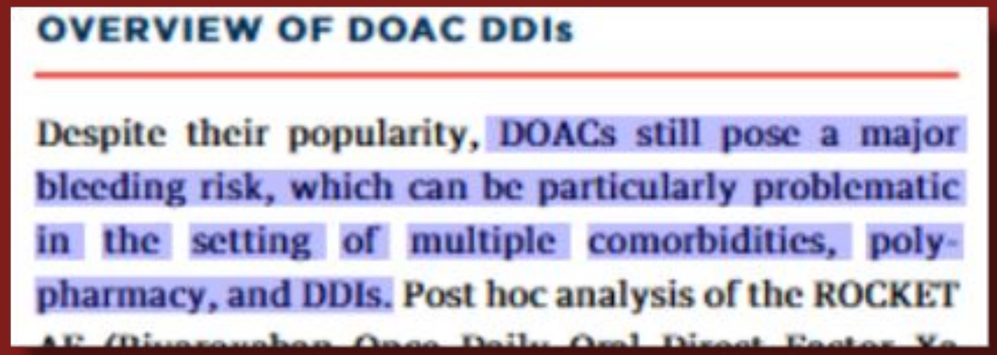
Kimura, S., *et al.* (2022). **Practical "1-2-3-4-Day" Rule for Starting Direct Oral Anticoagulants After Ischemic Stroke With Atrial Fibrillation: Combined Hospital-Based Cohort Study.** *AHA/ASA Journals.53(5)*



Development and validation of the practical "1-2-3-4-day" rule for starting direct oral anticoagulants after ischemic stroke/TIA with atrial fibrillation

Antikoagulan pada Stroke Kardioembolik (Atrial Fibrilasi)

Interaksi obat DOAC yang perlu dimonitoring apoteker



OVERVIEW OF DOAC DDIs

Despite their popularity, DOACs still pose a major bleeding risk, which can be particularly problematic in the setting of multiple comorbidities, polypharmacy, and DDIs. Post hoc analysis of the ROCKET

Wiggins, B. S., Dixon, D. L., Neyens, R. R., Page, R. L., II, & Gluckman, T. J. (2020). Select drug-drug interactions with direct oral anticoagulants: JACC review topic of the week. *Journal of the American College of Cardiology*, 75(11), 1341–1350.

TABLE 2 Summary of Recommendations for Drug-Drug Interactions With DOACs and Select Medications

Interacting Agent	DOAC	Recommendation for Management
Antiarrhythmic Agents		
Dronedarone	Apixaban	Combination is considered acceptable
	Betrixaban	Reduce dose of betrixaban to 80 mg once then 40 mg daily; avoid use if CrCl <30 ml/min
	Dabigatran	Administer 2 h before dronedarone Reduce dose to 75 mg twice daily for CrCl 30-50 ml/min Avoid use if CrCl <30 ml/min
	Edoxaban	Reduce dose of edoxaban by 50%
	Rivaroxaban	Avoid combination if CrCl <80 ml/min
Amiodarone	Apixaban	Combination is considered safe
	Betrixaban	Reduce dose of betrixaban to 80 mg once then 40 mg daily; avoid use if CrCl <30 ml/min
	Dabigatran	Combination considered safe if CrCl >50 ml/min Avoid combination if CrCl <50 ml/min for VTE and <30 ml/min for NVAF
	Edoxaban	Combination is considered safe
	Rivaroxaban	Avoid use if CrCl <80 ml/min
Calcium-Channel Blockers		
Verapamil	Apixaban	Combination is considered safe
	Betrixaban	Reduce dose of betrixaban to 80 mg once then 40 mg daily; avoid use if CrCl <30 ml/min
	Dabigatran	Avoid use if CrCl <30 ml/min for NVAF and <50 ml/min for VTE
	Edoxaban	Combination is considered safe
	Rivaroxaban	Avoid combination when CrCl is <80 ml/min
Diltiazem	Apixaban	Combination is considered safe
	Betrixaban	Reduce dose of betrixaban to 80 mg once, then 40 mg daily; avoid use if CrCl <30 ml/min
	Dabigatran	Combination is considered safe
	Edoxaban	Combination is considered safe
	Rivaroxaban	Avoid use if CrCl <80 ml/min
Enzyme Inducers		
Phenytoin, carbamazepine, primidone, rifampin, phenobarbital, St. John's wart	Apixaban Betrixaban Edoxaban Dabigatran Rivaroxaban	Avoid combination; consider warfarin

CrCl = creatinine clearance; DOAC = direct oral anticoagulant; NVAF = nonvalvular atrial fibrillation; VTE = venous thromboembolism.

Antikoagulan pada Stroke Kardioembolik (Atrial Fibrilasi)

Monitoring INR pada pasien warfarin: target 2–3

If a VKA is used, a target INR of 2.0–3.0 is recommended, with individual TTR ≥70%.	I	B

INR = *International Normalized Ratio,* angka hasil pemeriksaan darah yang menunjukkan **seberapa lama darah membeku.**

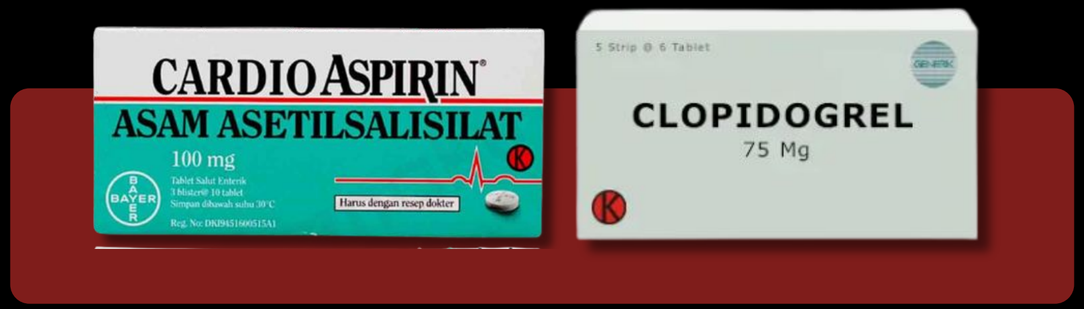
- Semakin **tinggi INR,** semakin **lama darah membeku** → darah lebih “**encer**”
- Semakin **rendah INR**, semakin **cepat darah membeku** → darah lebih “**kental**”

Makna klinis

- **INR <2** = darah terlalu cepat membeku → **risiko stroke / emboli naik**

Hindricks, G., Potpara, T., Dagres, N., Arbelo, E., Bax, J. J., Blomström-Lundqvist, C., et al. (2021). 2020 ESC guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). European Heart Journal, 42(5), 373–498.

Mitos & Misinformasi: "Pasien AF yang sudah dapat antiplatelet tidak perlu antikoagulan"



4. In patients with AF who are candidates for anticoagulation and without an indication for antiplatelet therapy, aspirin either alone or in combination with clopidogrel as an alternative to anticoagulation is not recommended to reduce stroke risk.[8,9]

Antiplatelet tidak dapat menggantikan antikoagulan pada AF, sehingga proteksi terhadap stroke kardioembolik tetap tidak adekuat.

PERAN Apoteker berperan **mendeteksi *undertreatment*** pada pasien AF berisiko tinggi yang **belum mendapat antikoagulan** atau masih **hanya menggunakan antiplatelet**

Hindricks, G., Potpara, T., Dagres, N., Arbelo, E., Bax, J. J., Blomström-Lundqvist, C., et al. (2021). 2020 ESC guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). European Heart Journal, 42(5), 373–498.

Mitos & Misinformasi: "Citicoline, Piracetam, Nimodipin adalah Obat Wajib Stroke"

4.11. Neuroprotective Agents

Recommendation for Neuroprotective Agents
Referenced studies that support the recommendation are summarized in the online data supplement.

COR	LOE	Recommendation
3: No Benefit	A	1. At present, in patients with AIS, the use of pharmacological or nonpharmacological neuroprotective treatments is not recommended to improve functional outcome.[1–5]

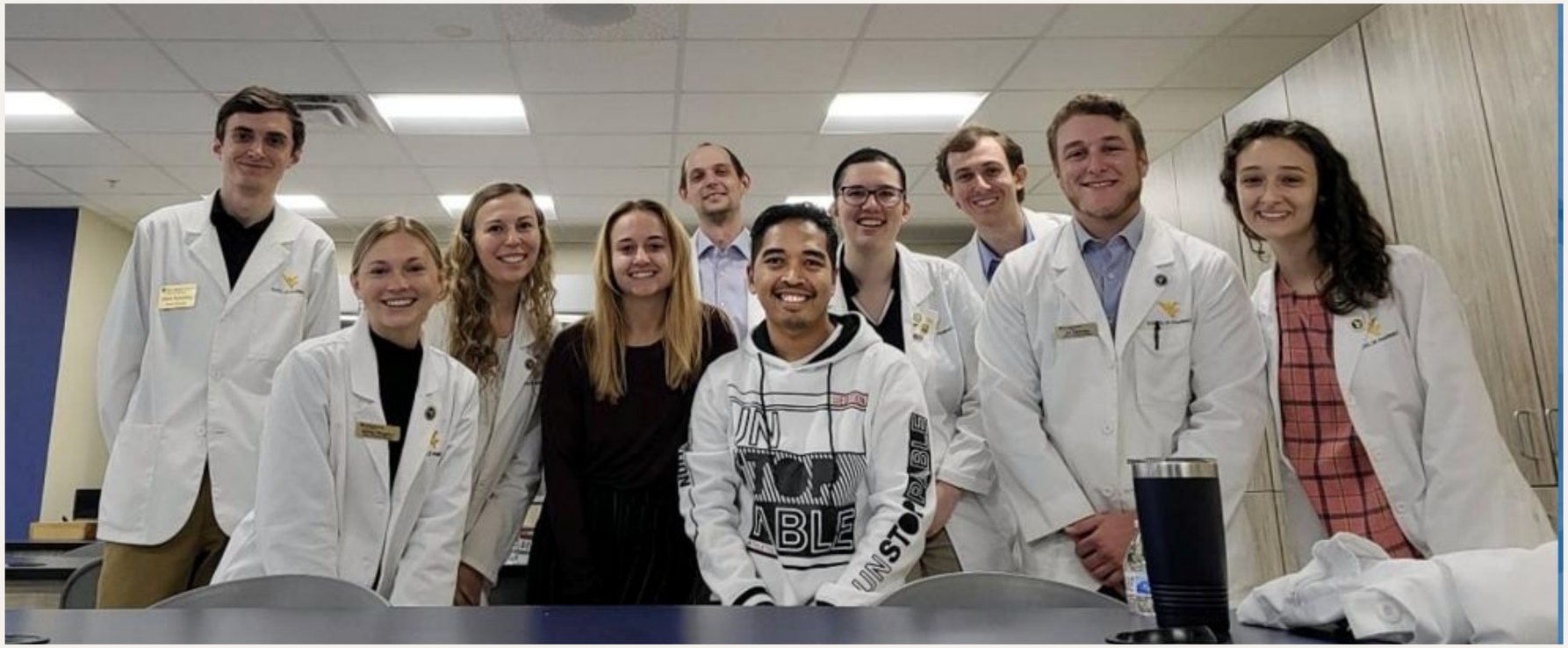
Berdasarkan AHA/ASA 2026, **terapi neuroprotektif** termasuk citicoline & piracetam **belum memiliki bukti manfaat klinis yang konsisten** dan tidak direkomendasikan sebagai terapi rutin stroke iskemik akut.

7. Early initiation of enteral nimodipine is beneficial in preventing delayed cerebral ischemia and improving functional outcomes after aSAH. Routine use of statin therapy and intravenous magnesium is not recommended.

Menurut AHA/ASA 2023, **nimodipin diberikan dini hanya pada aSAH** untuk mencegah *delayed cerebral ischemia* dan memperbaiki luaran fungsional, **bukan untuk stroke iskemik akut rutin.**

American Heart Association, & American Stroke Association. (2026). 2026 Guideline For The Early Management of Patients with Acute Ischemic Stroke. *Stroke*, 57, e1–e96.

American Heart Association/American Stroke Association. (2023). 2023 guideline for the management of patients with aneurysmal subarachnoid hemorrhage. *Stroke*, 54(7), e314–e370.



BAGIAN IV

Peran Strategis Apoteker Dalam Tim Stroke

Apoteker sebagai **Gatekeeper Keamanan Obat** di Stroke Unit

Apoteker aktif dalam **visite, review resep, pemantauan terapi,** serta **intervensi obat**, sehingga membantu **menurunkan DRP dan biaya rawat inap** (Chen et al., 2025).

Results: Pharmacist care significantly shortened antibiotic therapy (6.83 vs. 8.93 days, $P = 0.019$) and proton pump inhibitor (PPI) duration (7.29 vs. 9.50 days, $P < 0.001$), while reducing Ginkgolide injection use (47.53% vs. 55.56%, $P = 0.043$). Total hospitalization costs decreased by 10.4% ($1,403 ± 595.2 vs. $1,566 ± 496.0), with improved DIP settlement amount ($660.2 vs. $554.4, $P = 0.001$). Regression confirmed pharmacist intervention as an independent predictor of reduced costs and shorter stays. Medical staff reported high satisfaction with pharmacists' roles in medication safety (84.84%) but lower recognition of cost-saving efforts (64.19%).

Studi Chen et al. (2025) menunjukkan **keterlibatan apoteker klinis mempersingkat durasi antibiotik dan PPI** serta **mengurangi penggunaan injeksi TCM yang tidak tepat** melalui medication

TABLE 2 DRPs, their categories and causes.

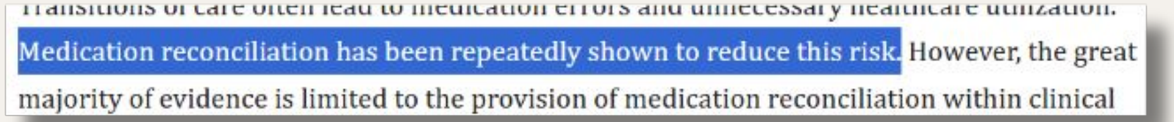
DRPs category (n,%)	Causes of the DRPs	Pharmacist care group	Standard care group
Indication	Cause	n, %	n, %
Antibiotics	Treatment duration is longer than necessary	5/2.24%	6/2.78%
	The usage or dosage is not appropriate	7/3.14%	9/4.17%
	An antimicrobial is not indicated	3/1.35%	4/1.85%
	A therapeutic duplication exists	4/1.79%	6/2.78%
	Incompatibility or adverse interactions were observed	6/2.69%	9/4.17%
PPI	The usage or dosage is not appropriate	15/6.73%	18/8.33%
	A PPI is not indicated	10/4.48%	16/7.41%
	A therapeutic duplication exists	1/0.45%	3/1.39%
	Incompatibility or adverse interactions were present	3/1.35%	8/3.70%
Danhong injection	The selection of drugs was not appropriate	1/0.45%	3/1.39%
	A therapeutic duplication exists	3/1.35%	2/0.93%
	Incompatibility or adverse interactions were present	1/0.45%	0/0.00%
Shuxuetong injection	The selection of drugs was not appropriate	2/0.90%	2/0.93%
	A therapeutic duplication exists	1/0.45%	1/0.46%
Ginkgolide injection	The usage or dosage is not appropriate	0/0.00%	3/1.39%
	A therapeutic duplication exists	19/8.52%	23/10.65%

DRP yang sering ditemukan: dosis tidak tepat, obat tanpa indikasi, interaksi obat, dan omisi terapi

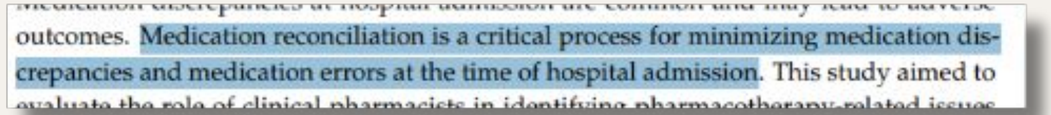
Chen, X., Hu, X., Su, Q., et al. (2025). Medication stewardship by clinical pharmacists in acute ischemic stroke care: A retrospective analysis of drug-related problem reduction and cost-saving outcomes. *Frontiers in Pharmacology*, 16, 1608457.

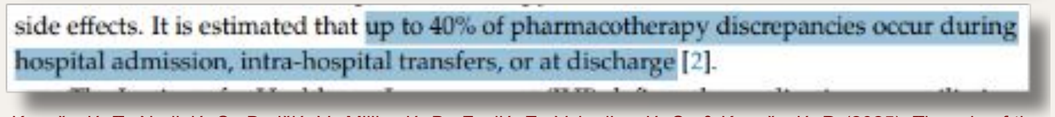
Medication Reconciliation:
Fondasi Keselamatan Pasien Stroke

Mengapa rekonsiliasi obat kritis pada pasien stroke?

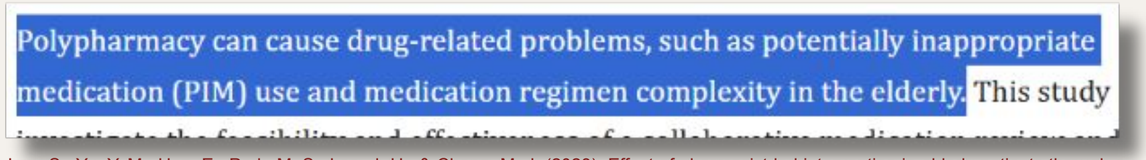

Transitions of care often lead to medication errors and unnecessary healthcare utilization. Medication reconciliation has been repeatedly shown to reduce this risk. However, the great majority of evidence is limited to the provision of medication reconciliation within clinical

Jošt, M., et al. (2024). Effectiveness of pharmacist-led medication reconciliation on medication errors at hospital discharge and healthcare utilization in the next 30 days: A pragmatic clinical trial. Frontiers in Pharmacology, 15, 1377781


outcomes. Medication reconciliation is a critical process for minimizing medication discrepancies and medication errors at the time of hospital admission. This study aimed to


side effects. It is estimated that up to 40% of pharmacotherapy discrepancies occur during hospital admission, intra-hospital transfers, or at discharge [2].

Kovačević, T., Nedinić, S., Barišić, V., Miljković, B., Fazlić, E., Vukadinović, S., & Kovačević, P. (2025). The role of the clinical pharmacist in hospital admission medication reconciliation in low-resource settings. Pharmacy, 13(4), 107


Polypharmacy can cause drug-related problems, such as potentially inappropriate medication (PIM) use and medication regimen complexity in the elderly. This study

Lee, S., Yu, Y. M., Han, E., Park, M. S., Lee, J.-H., & Chang, M. J. (2023). Effect of pharmacist-led intervention in elderly patients through a comprehensive medication reconciliation: A randomized clinical trial. Yonsei Medical Journal, 64(5), 336–343.

Medication reconciliation penting pada pasien stroke karena sebagian besar merupakan **lansia** dengan **polifarmasi** dan sering mengalami **gangguan komunikasi,** sehingga riwayat obat berisiko tidak lengkap saat transisi perawatan.

Medication Reconciliation:
Fondasi Keselamatan Pasien Stroke

Temuan Diskrepansi Obat pada Rekonsiliasi

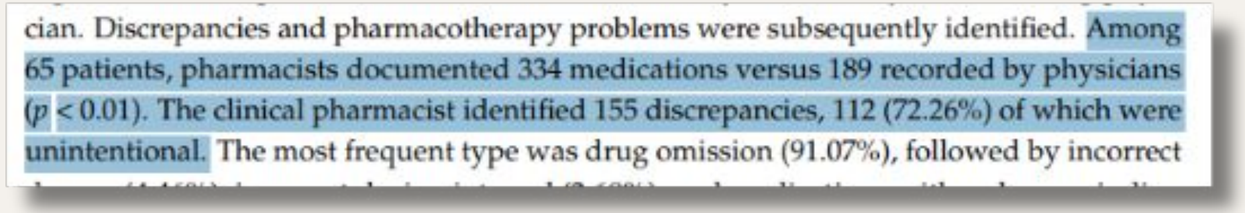
334 obat
pharmacists documented

189 obat
physicians documented

155
discrepancies

112 (72.26%)
unintentional

Jumlah pasien yang diteliti: **65 pasien**


cian. Discrepancies and pharmacotherapy problems were subsequently identified. Among 65 patients, pharmacists documented 334 medications versus 189 recorded by physicians ($p < 0.01$). The clinical pharmacist identified 155 discrepancies, 112 (72.26%) of which were unintentional. The most frequent type was drug omission (91.07%), followed by incorrect

- Apoteker mendokumentasikan obat lebih lengkap
- Ditemukan banyak perbedaan data obat
- Mayoritas diskrepansi tidak disengaja
- Berpotensi menyebabkan medication error

Kovačević, T., Nedinić, S., Barišić, V., Miljković, B., Fazlić, E., Vukadinović, S., & Kovačević, P. (2025). The role of the clinical pharmacist in hospital admission medication reconciliation in low-resource settings. Pharmacy, 13(4), 107

Medication Reconciliation:
Fondasi Keselamatan Pasien Stroke

The Institute for Healthcare Improvement (IHI) defines the medication reconciliation process as the systematic approach to obtaining accurate and complete information on all medications a patient is currently taking—including the name, dosage, frequency, and route of administration—and comparing this information with the medication orders documented at key transition points, such as admission, transfer, and discharge. The primary goal of medication reconciliation is to ensure the safe and appropriate use of medications throughout the continuum of care during hospitalization [3].

- Kumpulkan riwayat obat lengkap
- Cocokkan saat transisi perawatan
- Deteksi medication error

Beberapa obat yang perlu dimonitor:

- **Warfarin**: dosis & INR
- **DOAC**: dosis & fungsi ginjal
- **Antiplatelet**: indikasi & duplikasi terapi
- **Antiepilepsi**: interaksi dengan DOAC

- Kovačević, T., Nedinić, S., Barišić, V., Miljković, B., Fazlić, E., Vukadinović, S., & Kovačević, P. (2025). The role of the clinical pharmacist in hospital admission medication reconciliation in low-resource settings. Pharmacy, 13(4), 107
- Goel & Singh, 2025 https://doi.org/10.4103/bc.bc_151_24 (warfarin / OAC stroke)
- Wirth & Cuker, 2024 https://www.ncbi.nlm.nih.gov/books/NBK519025/ (DOAC safety)
- National Clinical Guideline for Stroke, 2023 https://www.ncbi.nlm.nih.gov/books/NBK519025/ (antiplatelet)
- J Clin Med, 2025 https://doi.org/10.3390/jcm15072597 (antiepilepsi–DOAC interaction)

Pharmaceutical Care - Jangka Panjang dan Kepatuhan

Randomized Controlled Trial > Int J Clin Pharm. 2025 Feb;47(1):99-106.

doi: 10.1007/s11096-024-01811-0. Epub 2024 Oct 12

The effect of clinical pharmacist led pharmaceutical care services on medication adherence, clinical outcomes and quality of life in patients with stroke: a randomised controlled trial

Kayhan Nuri Cengiz [1 2], Ipek Midi [3], Mesut Sancar [4]

Affiliations + expand

PMID: 39395139 DOI: 10.1007/s11096-024-01811-0

Full text links | Cite

Results: This study included 193 patients (89 and 104 patients in the IG and the UCG, respectively; mean age: 60.1 years), of whom 67.4% were male. At the one-year follow-up evaluation, the percentage of adherent patients (86.5% vs 47.1%, $p < 0.001$) and the total Stroke-Specific Quality of Life score (184.9 vs 166.0, $p < 0.001$) were higher in the IG than in the UCG. The stroke recurrence rate at the one-year follow-up (2.2% vs 10.6%, $p = 0.044$) was lower in the IG than in the UCG.

Conclusion: Pharmaceutical care services improved the medication adherence, quality of life and clinical outcomes of patients with stroke.

Cengiz, K. N., Midi, I., & Sancar, M. (2025). The effect of clinical pharmacist-led pharmaceutical care services on medication adherence, clinical outcomes and quality of life in patients with stroke: A randomised controlled trial. International Journal of Clinical Pharmacy, 47(1), 99–106.

Program ***pharmaceutical care*** selama 1 tahun **meningkatkan kepatuhan, kualitas hidup, dan menurunkan kekambuhan stroke.**

Pharmaceutical Care - Jangka Panjang dan Berkelanjutan

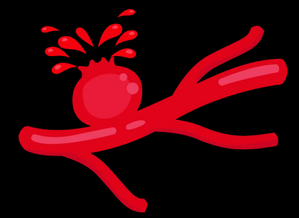
Konseling discharge

After an ischaemic stroke or transient ischaemic attack, patients have a high risk of having another stroke. Secondary stroke prevention includes antiplatelet therapy, statins and antihypertensives

Tremonti, C., & Thieben, M. (2021). Drugs in secondary stroke prevention. Australian Prescriber, 44(3), 85–90. https://doi.org/10.18773/austprescr.2021.018

Saat **discharge**, pasien harus diedukasi untuk **tetap melanjutkan antiplatelet, statin, dan antihipertensi** karena merupakan terapi utama **pencegahan stroke berulang**

Monitoring Efek Samping Obat (MESO)



Antiplatelet

Perdarahan GI

Statin

Miopati

Antihipertensi

Hipotensi

Farmakogenomik dalam Praktik

Sudahkah Rumah Sakit Kita Siap?

Tes Genotip CYP2C19

sebelum pemberian clopidogrel

Conclusion: Antiplatelet therapy guided by CYP2C19 genotyping is an effective strategy for optimizing the secondary prevention of ischemic stroke. For IM and PM patients, switching from clopidogrel to ticagrelor significantly reduces the risk of

basis for clinical individualized medication. CYP2C19 gene polymorphism in cytochrome P450 enzyme system is closely related to clopidogrel metabolism and efficacy (**Zheng et al., 2019**). CYP2C19 gene has multiple alleles, among which *2 and *3 are functional deletion alleles. Carrying these alleles results in absent CYP2C19

Sun, H., et al. (2026). CYP2C19 genotype-guided escalation to ticagrelor vs. clopidogrel in secondary stroke prevention: A retrospective cohort study. Frontiers in Pharmacology, 17, 1747121.

Tes genotip CYP2C19 membantu m**enentukan efektivitas clopidogrel** sebelum terapi dimulai.

Polimorfisme alel *2 dan *3

Resistensi Clopidogrel

Pasien membawa alel *2 atau *3

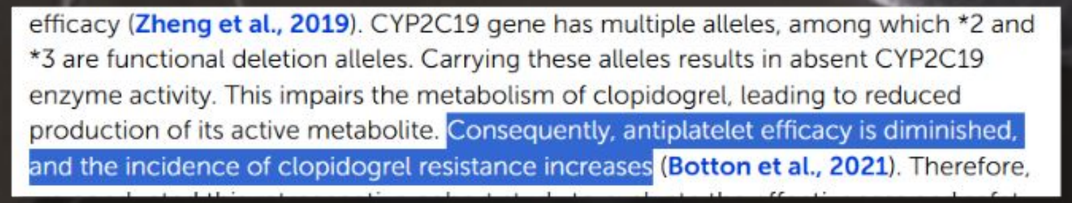
Clopidogrel tidak dapat diubah menjadi metabolit aktif secara optimal.

Prevalensi PM di Indonesia

***2 = 24,8%**

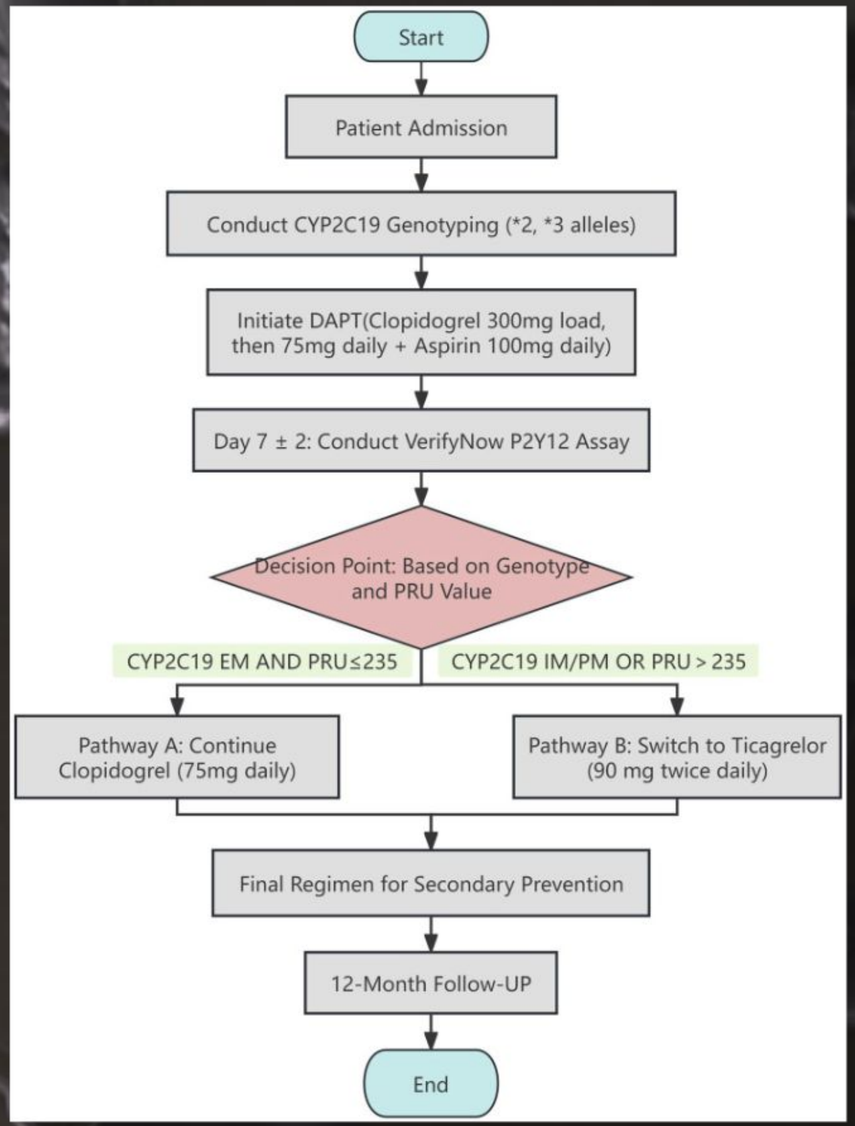
***3 = 6,6%**

Hardi, H., Barinda, A. J., Mahata, L. E., & Fitrianti, Z. (2025). CYP2C19 variability and clinical outcomes of clopidogrel, proton pump inhibitors, and voriconazole in Southeast Asia: A systematic review and meta-analysis. Frontiers in Pharmacology, 16, 1572886.



efficacy (**Zheng et al., 2019**). CYP2C19 gene has multiple alleles, among which *2 and *3 are functional deletion alleles. Carrying these alleles results in absent CYP2C19 enzyme activity. This impairs the metabolism of clopidogrel, leading to reduced production of its active metabolite. Consequently, antiplatelet efficacy is diminished, and the incidence of clopidogrel resistance increases (**Botton et al., 2021**). Therefore,

Sun, H., et al. (2026). CYP2C19 genotype-guided escalation to ticagrelor vs. clopidogrel in secondary stroke prevention: A retrospective cohort study. Frontiers in Pharmacology, 17, 1747121.



Kapan switch ke ticagrelor?

(PRU ≤235) on VerifyNow testing continued the original clopidogrel regimen (75 mg daily).

Pathway B (Switch to Ticagrelor): The P2Y12 inhibitor was switched from clopidogrel to ticagrelor (90 mg twice daily) for patients meeting any of the following criteria:

- CYP2C19 IM or PM phenotype;
- Any metabolic phenotype but with VerifyNow testing showing HPR (PRU >235).

Sun, H., Deng, M., Yu, H., & Yang, J. (2026). CYP2C19 genotype-guided escalation to ticagrelor vs. clopidogrel in secondary stroke prevention: A retrospective cohort study. Frontiers in Pharmacology, 17, 1747121.

Peran apoteker dalam **interpretasi hasil farmakogenomik** dan rekomendasi terapi

Interpretasi hasil genotip

→ membaca hasil CYP2C19 (NM, IM, PM)

Identifikasi poor metabolizer

→ mengenali pasien pembawa alel *2/*2, *2/*3, *3/*3

Rekomendasi switch terapi

→ menyarankan ticagrelor / prasugrel bila clopidogrel kurang efektif

Monitoring efektivitas dan perdarahan

→ menilai outcome klinis dan efek samping

Pereira, N. L., et al. (2024). CYP2C19 Genetic Testing for Oral P2Y12 Inhibitor Therapy: A Scientific Statement From the American Heart Association. Circulation, 150(6), e129–e150. https://doi.org/10.1161/CIR.0000000000001257

Thank You

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