Supplementary Online Content

Wang Y, Li Z, Zhao X, et al; for the GOLDEN BRIDGE—AIS Investigators. Effect of a Multifaceted Quality Improvement Intervention on Hospital Personnel Adherence to Performance Measures in Patients With Acute Ischemic Stroke in China: A Randomized Clinical Trial. *JAMA*. doi:10.1001/jama.2018.8802

This supplementary material has been provided by the authors to give readers additional information about their work.

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eAppendix. Details of the baseline survey

We conducted a baseline survey in participating clusters using the same eligible criteria for patient's inclusion (20 patients per cluster were prospectively included in this phase). This survey was conducted before randomization in order to avoid potential systematic errors caused by awareness of allocation to intervention and control groups. In all participating clusters, data were collected prospectively by a trained independent coordinator. Adherence to guidelines was assessed by a chart review, patient files, and physician prescriptions. Data were entered using a web-based data capture system as the same tool as that in the formal trial. The main objective of the baseline pre-randomization survey was to assess whether clusters were comparable with regard to baseline adherence to evidence-based performance measures and to obtain reliable estimates for our sample size estimation as reported in the main text. We used the same endpoint definition used in the randomized phase. The composite measure was defined as the total number of interventions performed among eligible patients divided by the total number of possible interventions among eligible patients. There were no statistically significant differences between clusters that were later randomized to the intervention group and cluster later randomized to the control groups with respect to the composite measure of all eligible evidence-based performance measures. The composite measure of individual performance measures (intervention versus control group) was 80.2% versus 79.5%. Adherent rates of individual performance measures (intervention versus control group) were: intravenous recombinant tissue plasminogen activator <2 hours (22.6% vs. 13.0%), early antithrombotics (95.4% vs. 88.4%), dysphagia screening (79.6% vs. 88.1%), deep vein thrombosis prophylaxis (14.4% vs. 7.8%), discharge antithrombotics (91.6% vs. 91.6%), anticoagulation for atrial fibrillation/flutter (14.8% vs. 28.2%), Lipid lowering agent for lowering low-density lipoprotein (66.9% vs. 64.6%), antihypertension for hypertension disease (69.4% vs. 71.2%), and hypoglycemic therapy for diabetes mellitus (83.2% vs. 78.2%).

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eTable 1. Specifications of guideline-recommended performance measures

Performance measure of ischemic stroke care	Performance measure definition for eligible patients*
Performance measures at the beginning of hospitalization	
IV rt-PA 2 Hour	Intravenous recombinant tissue plasminogen activator (IV rtPA) in patients who arrive within 2 hours after initial symptom onset and treated within 3 hours of symptom onset
Early Antithrombotics	Antithrombotic therapy prescribed within 2 days of hospitalization, including antiplatelet or anticoagulant therapy
Dysphagia Screening	Dysphagia screening prior to any oral intake
DVT Prophylaxis	Patients at risk for Deep vein thrombosis (DVT) (non-ambulatory) who received DVT prophylaxis by end of hospital day two, including pneumatic compression, warfarin sodium or heparin sodium
Performance measures at discharge	
Discharge Antithrombotics	Antithrombotic therapy prescribed at discharge
Anticoagulation for Atrial Fibrillation/Flutter	Anticoagulation prescribed at discharge for patients with atrial fibrillation or atrial flutter documented during the hospitalization
LDL 100 or Not Documented	Lipid lowering agent prescribed at discharge if Low-density lipoprotein (LDL) ⩾100 mg/dL, if patient treated with lipid lowering agent prior to admission, or LDL not documented
Antihypertension for hypertension disease	Antihypertension medication prescribed at discharge for patients with history of hypertension disease or hypertension disease documented during the hospitalization
Hypoglycemic therapy for diabetes mellitus	Hypoglycemic medication prescribed at discharge for patients with history of diabetes mellitus or diabetes mellitus documented during the hospitalization

Abbreviations: LDL, Low-density lipoprotein.

* Eligible patients are those without any medical contraindications (eg, treatment intolerance, excessive risk of adverse reaction, patient/family refusal, or terminal illness/comfort care only) documented as reasons for nontreatment for each of the applicable measures. Also excludes patients who are discharged to hospice or another short-term general hospital, leave against medical advice before the end of hospital day 2. For performance measures at the beginning of hospitalization except for rt-PA measure, excludes patients who died before the end of hospital day 2. The acute rt-PA

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measure excludes patients with missing or erroneous onset, arrival or treatment times, those who began IV t-PA at an outside hospital, or who initiated IV t-PA after 180 minutes from onset. For performance measures at discharge, excludes patients who died during hospitalization.

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eTable 2. Baseline Characteristics between Patients with and without the 1-year modified Rankin Scale

	One-year mRS*	Loss to one-year mRS	P value
Demographics			
Age, yr, median (IQR)	65 (56-74)	64(56-74)	0.81
Gender, male	2497/3949 (63.2%)	546/851 (64.2%)	0.61
Medical history			
Ischemic stroke	1137/3949 (28.8%)	251/851 (29.5%)	0.68
Diabetes	890/3949 (22.5%)	196/851 (23.0%)	0.75
Hypertension	2552/3949 (64.6%)	538/851 (63.2%)	0.44
Dyslipidemia	285/3949 (7.2%)	62/851 (7.3%)	0.94
CAD/previous MI	512/3949 (13.0%)	97/851 (11.4%)	0.21
Atrial fibrillation	200/3949 (5.1%)	45/851 (5.3%)	0.79
Ever smoking	1736/3949 (44.0%)	380/851 (44.7%)	0.71
NIHSS at admission, median (IQR)	3 (2-6)	3 (2-6)	0.99

* Patients had the data of 1-year modified Rankin Scale. CAD indicates coronary artery disease; ED, emergency department; EMS, emergency medical service; IQR, inter quartile range; MI, myocardial infarction; mRS, modified Rankin Scale; NIHSS, National Institutes of Health Stroke Scale (Rang, 0-42).

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eTable 3. Secondary outcomes: Individual New Vascular Events at 3, 6, and 12 Months

New vascular events*	Intervention No. / Total (%)	Control No. / Total (%)	Absolute difference % (95% CI) [a]	P value	HR (95% CI) [a]	P value
3-month						
Ischemic stroke	44/2400 (1.8)	55/2400 (2.3)	-0.57 (-1.91-0.76)	0.40	0.89 (0.59-1.36)	.59
Hemorrhagic stroke	14/2400 (0.6)	20/2400 (0.8)	-0.35 (-0.92-0.22)	0.23	0.85 (0.40-1.83)	.68
Myocardial infarction	3/2400 (0.1)	5/2400 (0.2)	-0.10 (-0.36-0.17)	0.48	0.58 (0.13-2.67)	.48
Vascular death	46/2400 (1.9)	67/2400 (2.8)	-1.43 (-2.33- -0.54)	0.001	0.62 (0.42-0.92)	.02
6-month						
Ischemic stroke	74/2400 (3.1)	102/2400 (4.3)	-1.40 (-2.82-0.02)	0.05	0.72 (0.53-0.99)	.04
Hemorrhagic stroke	17/2400 (0.7)	21/2400 (0.9)	-0.25 (-0.80 - 0.30)	0.38	0.92 (0.46-1.82)	.80
Myocardial infarction	8/2400 (0.3)	8/2400 (0.3)	-0.03 (-0.35-0.29)	0.86	0.78 (0.27-2.24)	.64
Vascular death	70/2400 (2.9)	82/2400 (3.4)	-1.06 (-2.08- -0.04)	0.04	0.78 (0.56-1.10)	.16
12-month						
Ischemic stroke	117/2400 (4.9)	160/2400 (6.7)	-1.84 (-3.45- -0.23)	0.03	0.73 (0.57-0.93)	.01
Hemorrhagic stroke	23/2400 (1.0)	24/2400 (1.0)	-0.08 (-0.71-0.55)	0.80	1.02 (0.55-1.88)	.96
Myocardial infarction	11/2400 (0.5)	14/2400 (0.6)	-0.13 (-0.46-0.21)	0.45	0.71 (0.30-1.67)	.43
Vascular death	91/2400 (3.8)	125/2400 (5.2)	-1.94 (-3.26- -0.62)	0.004	0.71 (0.54-0.94)	.02

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* A patient may suffer from different new vascular events after stroke. So, the sum of all new vascular events is more than the number of patients with new vascular events during follow up.

[a] Adjust for patient and hospital characteristics, including age, gender, history of ischemic stroke, hypertension disease, diabetes mellitus, hyperlipidemia, atrial fibrillation, coronary artery disease and previous myocardial infarction, ever smoking, NIHSS at admission, hospital grade, region, stroke unit, teaching hospital status, No. of neurological ward beds.

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eTable 4. Adherence to individual performance measures of the Overall Population for Sensitivity Analysis

Subgroup	Intervention No. / Total (%)	Control No. / Total (%)	Absolute difference % (95% CI) [a]	P value	OR_{PA} (95% CI) [a]	P value
Composite measure, mean (SD)	85.3 (15.2)	80.9 (17.1)	4.20 (1.77-6.63)	<0.001	1.36 (1.11-1.67)	0.003
Performance measures at the beginning of hospitalization						
IV rt-PA 2 Hour	46 /254(18.11)	23/238 (9.66)	5.81 (-4.57-16.19)	0.27	2.60 (0.76-8.87)	0.13
Early Antithrombotics	2307/2400 (96.1)	2253/2400 (93.9)	2.68 (0.48-4.87)	0.02	1.73 (1.05-2.87)	0.03
Dysphagia Screening	2255/2328 (96.9)	2040/2139 (95.4)	1.72 (-1.95-5.40)	0.36	2.37 (0.69-8.18)	0.17
DVT Prophylaxis	178/672 (26.5)	66/606 (10.9)	14.79 (3.16-26.42)	0.01	2.09 (0.95-4.62)	0.07
Performance measures at discharge						
Antithrombotics	2272/2400 (94.7)	2141/2400 (89.3)	5.32 (0.44-10.20)	0.03	1.89 (0.99-3.64)	0.05
Anticoagulation for Atrial Fibrillation	63/182 (34.6)	39/174 (22.5)	12.90 (-3.51-29.3)	0.12	1.78 (0.61-5.14)	0.29
Lipid-lowering for LDL >100 mg/dL	1415/1517 (93.3)	1439/1586 (90.8)	2.46 (-2.03-6.95)	0.28	1.17 (0.61-2.24)	0.63
Antihypertensive Medication	1510/1870 (80.7)	1372/1803 (76.1)	6.32 (-0.58-13.21)	0.07	1.47 (0.97-2.23)	0.07
Antidiabetic Medication	653/743 (87.9)	557/688 (81.1)	6.16 (1.70-10.62)	0.007	1.59 (1.11-2.23)	0.01

CI, confidence interval; DVT, deep vein thrombosis; ICC, intracluster correlation coefficient; IV, intravenous; LDL, low-density lipoprotein; OR_{PA}, population average odds ratio; rt-PA, recombinant tissue plasminogen activator; and SD, standard deviation.

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IV rt-PA 2 Hour indicated that IV rtPA in patients who arrive within 2 hours after initial symptom onset and treated within 3 hours of symptom onset. Early Antithrombotics indicated that antithrombotic therapy prescribed within 48 hours2 days of hospitalization. Dysphagia screening was conducted prior to any oral intake during hospitalization. DVT prophylaxis was conducted among patients (non-ambulatory) by end of hospital day two.

[a] Adjusted patient's characteristics including age, gender, history of ischemic stroke, hypertension disease, diabetes mellitus, hyperlipidemia, atrial fibrillation, coronary artery disease and previous myocardial infarction, ever smoking, and NIHSS at admission, and adjusted hospital's characteristics including hospital grade, region, stroke unit, teaching hospital status, No. of neurological ward beds.

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