Advancing Stroke Systems of Care to Improve Outcomes

Update on Target: Stroke Phase II

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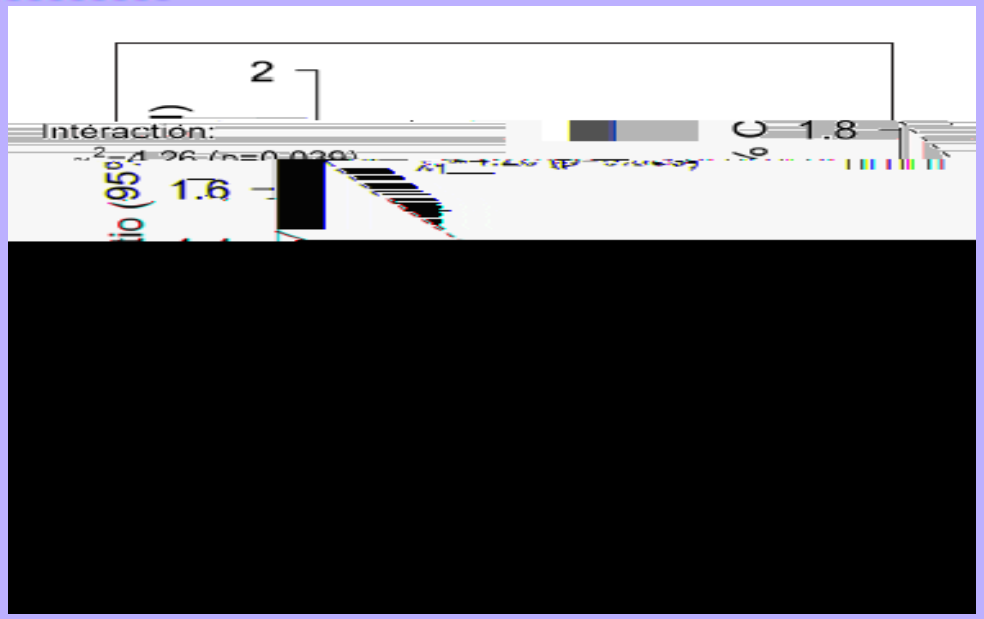
Effect of Intravenous tPA is Time Dependent



Stroke 2016;47:2373-2379
Circulation 2017;135:128–139

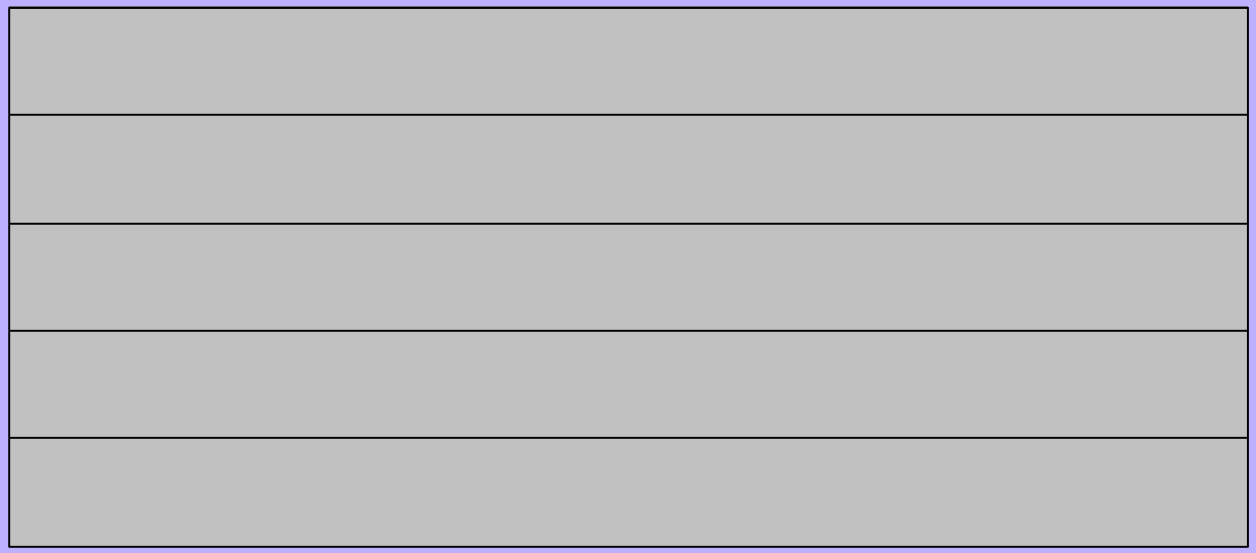
AHA/ASA Guideline Recommendations

EDs should establish standard operating procedures and protocols to triage stroke patients expeditiously (Class I, Level of Evidence B).

Standard procedures and protocols should be established for benchmarking time to evaluate and treat eligible stroke patients with rt-PA expeditiously (Class I, Level of Evidence B).

Target treatment with rt-PA should be within 1 hour of the patient's arrival in the ED (Class I, Level of Evidence A).

Comprehensive overview of nursing and interdisciplinary care of the acute ischemic stroke patient: a scientific statement from the American Heart. Association. Stroke 2009;40;2911-2944



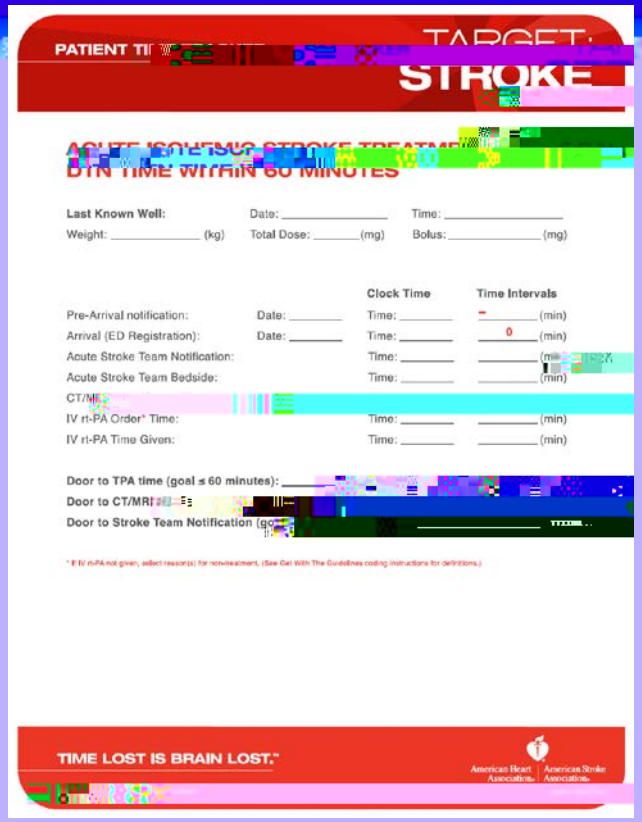
Target: Stroke 10 Key Best Practice Strategies

1. Hospital pre-notification by Emergency Medical Services
2. Rapid triage protocol and stroke team notification
3. Single call/paging activation system for entire stroke team
4. Use of a stroke toolkit containing clinical decision support, stroke-specific order sets, guidelines, hospital-specific algorithms, critical pathways, NIH Stroke Scale and other stroke tools
5. Rapid acquisition and interpretation of brain imaging
6. Rapid Laboratory Testing (including point-of-care testing) if indicated
7. Pre-mixing tPA medication ahead of time for high likelihood candidates
8. Rapid access to intravenous tPA in the ED/brain imaging area
9. Team-based approach
10. Rapid data feedback to stroke team on each patient's DTN time and other performance data

Fonarow GC et al Stroke. 2011;42:2983-2989.

Customizable Implementation Tools

- Patient time-trackers
- Guideline based algorithms
- tPA checklist
- Standardized order sets
- Dosing charts
- Clinical pathways
- Evidence-based protocols
- EMS tools
- Patient educational materials
- Other tools



Target: Stroke tools: www.targetstroke.org
Clinical tools library: heart.org/strokeclinicaltools.

Fonarow GC et al Stroke. 2011;42:2983-2989.

1,587,230 Patients with Acute Ischemic Stroke

Target: Stroke Results: Impact on DTN Times

7KH SHUFHQWDJH RI SDWLHQWV ZLWK '71 W
from 29.6% immediately prior to the start of Target: Stroke in Quarter 4 of 2009) to 53.3% in Quarter 3 of 2013 (P<0.0001).

The median DTN time was 74 minutes in Quarter 4 of 2009 immediately prior to initiation of Target: Stroke and declined to 59 minutes by Quarter 3 of 2013 (absolute difference 15 minutes, P<0.0001).

In 2009, prior to initiation of Target: Stroke, 15.6% of hospitals had '71 WLPHV ” PLQXWHV LQ RU PRUH RI W
whereas in 2013, this benchmark was being met by 46.7% of participating hospitals (P<0.0001).

Fonarow GC et al. JAMA. 2014;311(16):1632-1640.

Target: Stroke Results: tPA Use

The Target: Stroke intervention was also associated with an increase in tPA use.

tPA use in eligible patients arriving by 2 hours and treated by 3 hours: 64.7% pre- vs. 85.2% post-intervention, P<0.0001

tPA use in eligible patients arriving by 3.5 hours and treated by 4.5 hours: 22.5% pre- vs. 63.9% post-intervention, P<0.0001

tPA use among all acute ischemic stroke patients: 5.7% pre- vs. 8.1% post-intervention, P<0.0001

No evidence for unintended consequences with the intervention with tPA use being avoided in patients who may have less favorable DTN times

Fonarow GC et al. JAMA. 2014;311(16):1632-1640.

Clinical Outcomes Pre- and Post-Target: Stroke in Patients in Patients with Onset to Treatment Time within 4.5 Hours

Outcome	Pre-Target: Stroke (n=29,986)	Post-Target: Stroke (n=53,234)	P Value	Unadjusted Odds Ratios (95% CI)	P Value	Adjusted Odds Ratios (95% CI)*	P Value*
In-Hospital Mortality	9.95%	8.08%	<0.0001	0.79 (0.75-0.84)	<0.0001	0.90 (0.84-0.95)	0.0004
Discharge Home	37.6%	43.3%	<0.0001	1.25 (1.20-1.29)	<0.0001	1.13 (1.08-1.17)	<0.0001
Ambulatory Status Independent	42.2%	45.9%	<0.0001	1.16 (1.10-1.22)	<0.0001	1.02 (0.96-1.09)	0.4538
Symptomatic ICH	5.74%	4.74%	<0.0001	0.81 (0.75-0.88)	<0.0001	0.84 (0.78-0.92)	<0.0001
Any tPA Complications	6.75%	5.54%	<0.0001	0.80 (0.75-0.86)	<0.0001	0.84 (0.78-0.91)	<0.0001

*Adjusted for patient characteristics including age, sex, race, medical history of atrial fibrillation, prosthetic heart valve, previous stroke/transient ischemic attack, coronary heart disease or prior myocardial infarction, carotid stenosis, peripheral vascular disease, hypertension, dyslipidemia, and current smoking, stroke severity (NIHSS), arrival time during regular work hours, arrival mode, onset-to-arrival time; hospital characteristics of hospital size, region, teaching status, certified primary stroke center, annual volume of tPA, and annual stroke discharge.

Fonarow GC et al. JAMA. 2014;311(16):1632-1640.

National Impact of Target: Stroke:

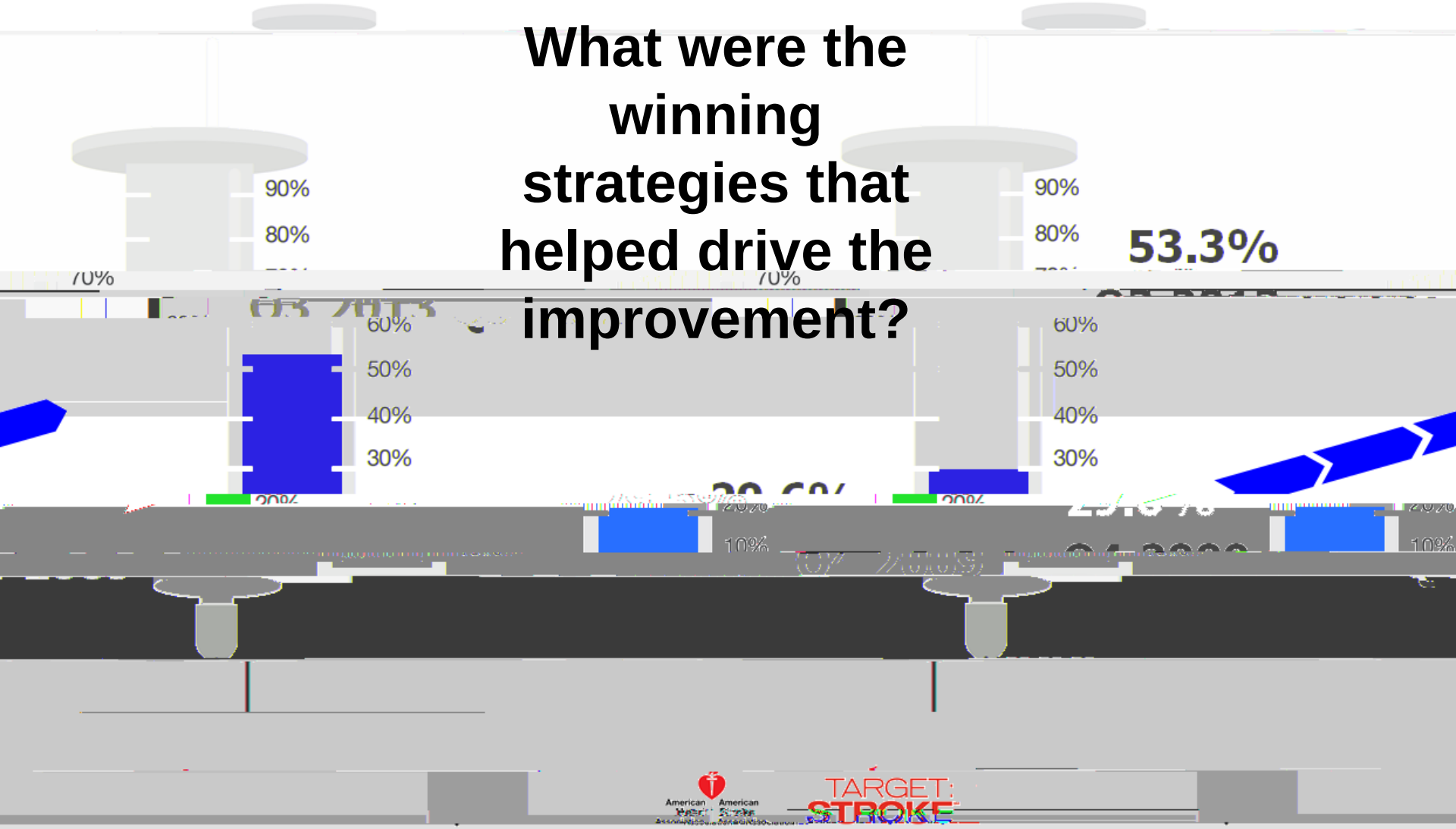
1. Care: 18,238 more patients treated with tPA
2. Clinical Outcomes: 977 additional lives saved
3. Quality of Life: 5,883 patients reduced their long-term disability

Trends in Door-to-Thrombolysis Time in the Safe Implementation of Stroke Thrombolysis Registry

750 clinical centers
in >40 countries
involving n=45,079 tPA
patients enrolled
between 2002-2011

Stroke. 2015;46:1275-1280

What were the winning strategies that helped drive the improvement?



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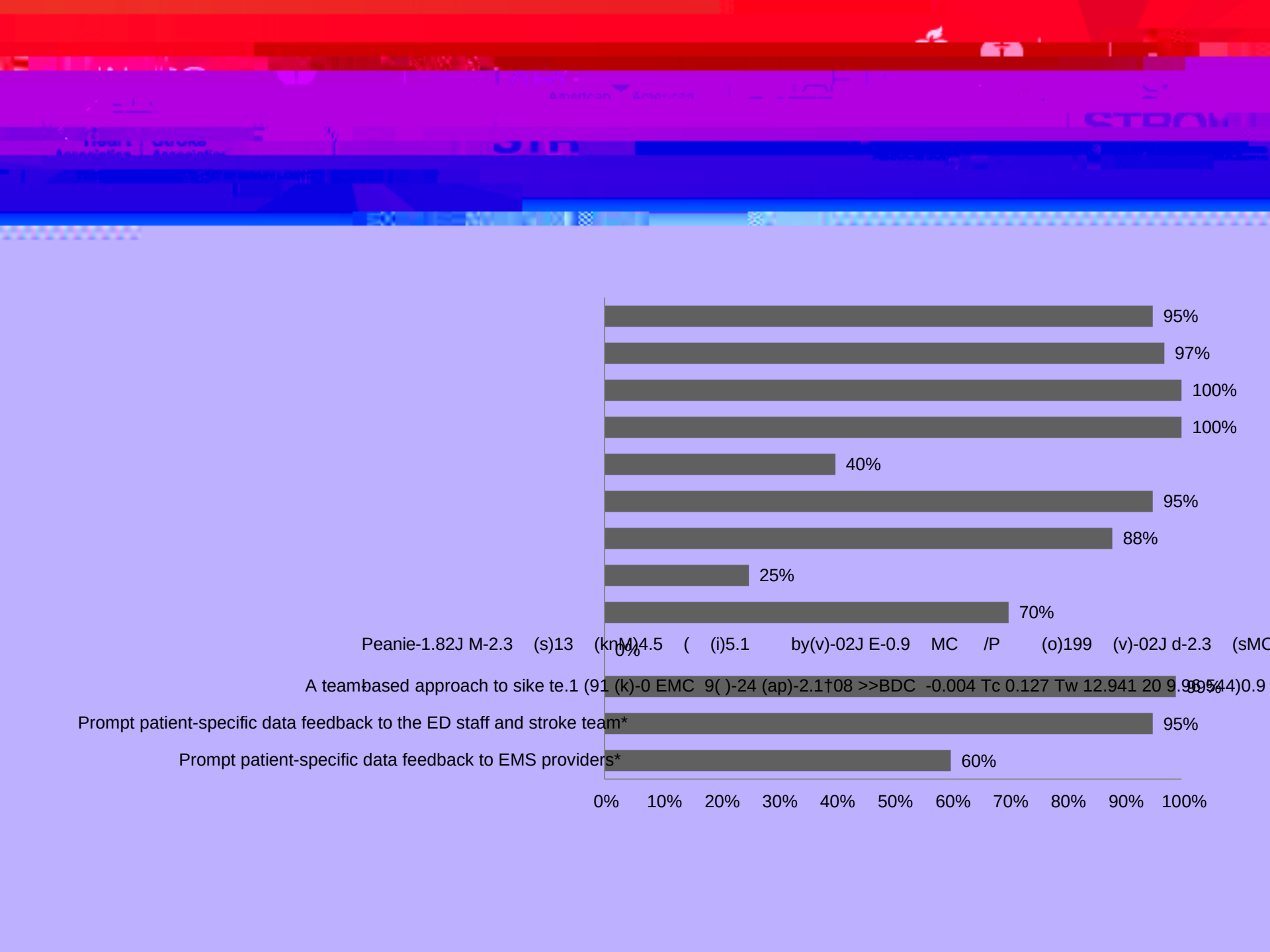
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Prompt patient-specific data feedback to the ED staff and stroke team*
Prompt patient-specific data feedback to EMS providers*
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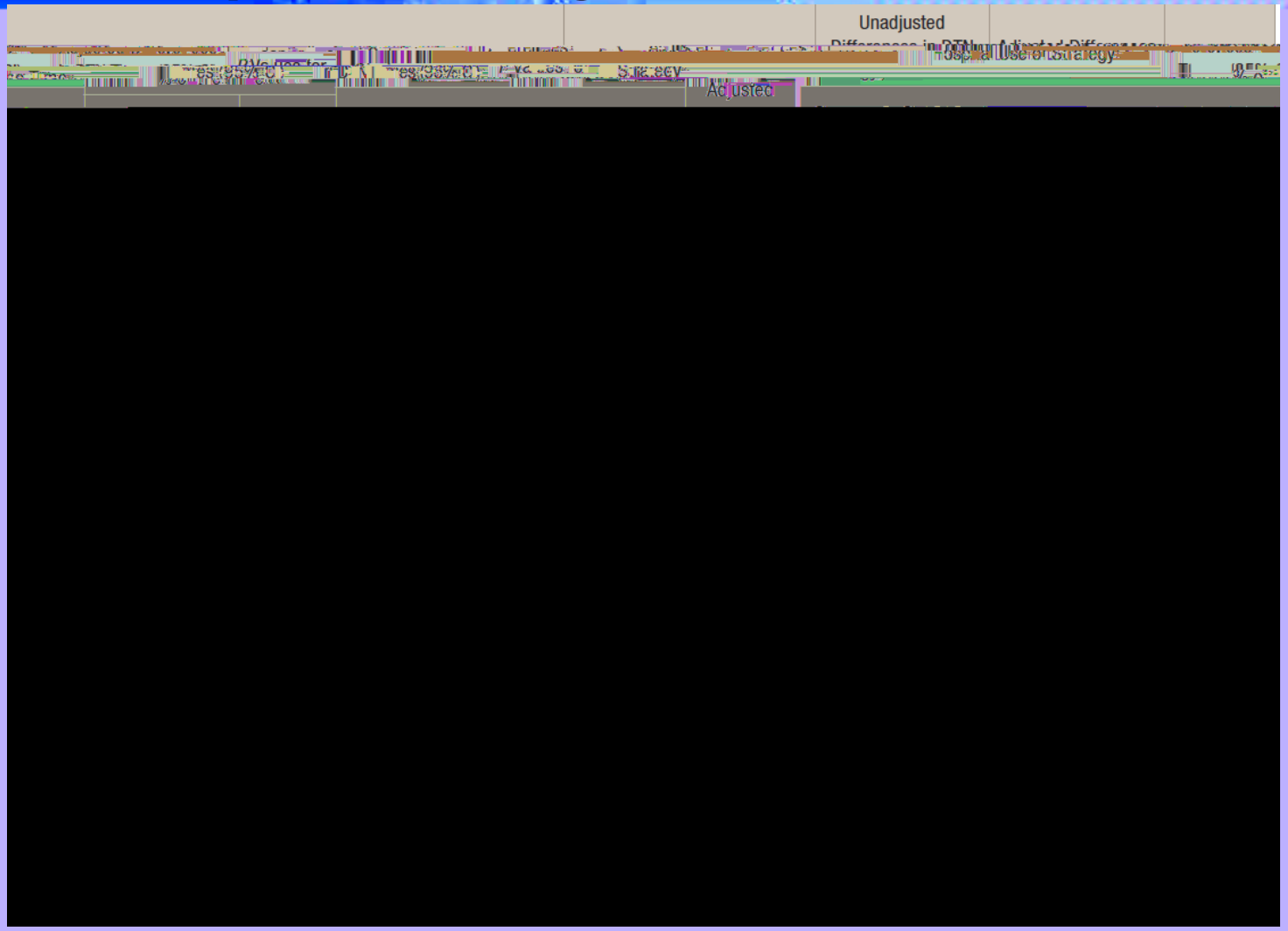
Hospital Strategies and DTN Times



Xian Y, et al Circ Cardiovasc Qual Outcomes. 2017;10:e003227

Hospital Strategies and DTN Times

- We identified 16 strategies associated with significant reductions in DTN times
- On average, 1.25 minutes could be saved for each strategy implemented
- This represents a potential to reduce DTN times by as much as 20 minutes (95% CI 15-25 minutes) if all strategies were used
- At the patient level, a reduction of 20 minutes in DTN times would save 36 million neurons, reduce the risk of mortality and sICH, and increase the chance of functional independency
- At the national level, a reduction of 20 minutes could bring the median DTN times towards 30 minutes

Xian Y, et al Circ Cardiovasc Qual Outcomes. 2017;10:e003227

Target: Stroke Phase II

- **National Goal:**
  - Achieve DTN times within 60 minutes for 75% of eligible patients
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Target: Stroke Phase II 12 Key Best Practice Strategies

1. Hospital pre-notification by Emergency Medical Services
2. Rapid triage protocol and stroke team notification
3. Single call/paging activation system for entire stroke team
4. Use of a stroke toolkit containing clinical decision support, stroke-specific order sets, guidelines, hospital-specific algorithms, critical pathways, NIH Stroke Scale and other stroke tools
5. Timer or clock attached to chart, clipboard, or bp4>307.08 Tm (4.)Tj /.08514 >>

- Findings from Target: Stroke support the favorable impact of applying performance improvement techniques: identifying best practices, clinical decision support, guideline-driven care improvement tools, educational outreach, collaborative support, performance profiling, feedback, and recognition.
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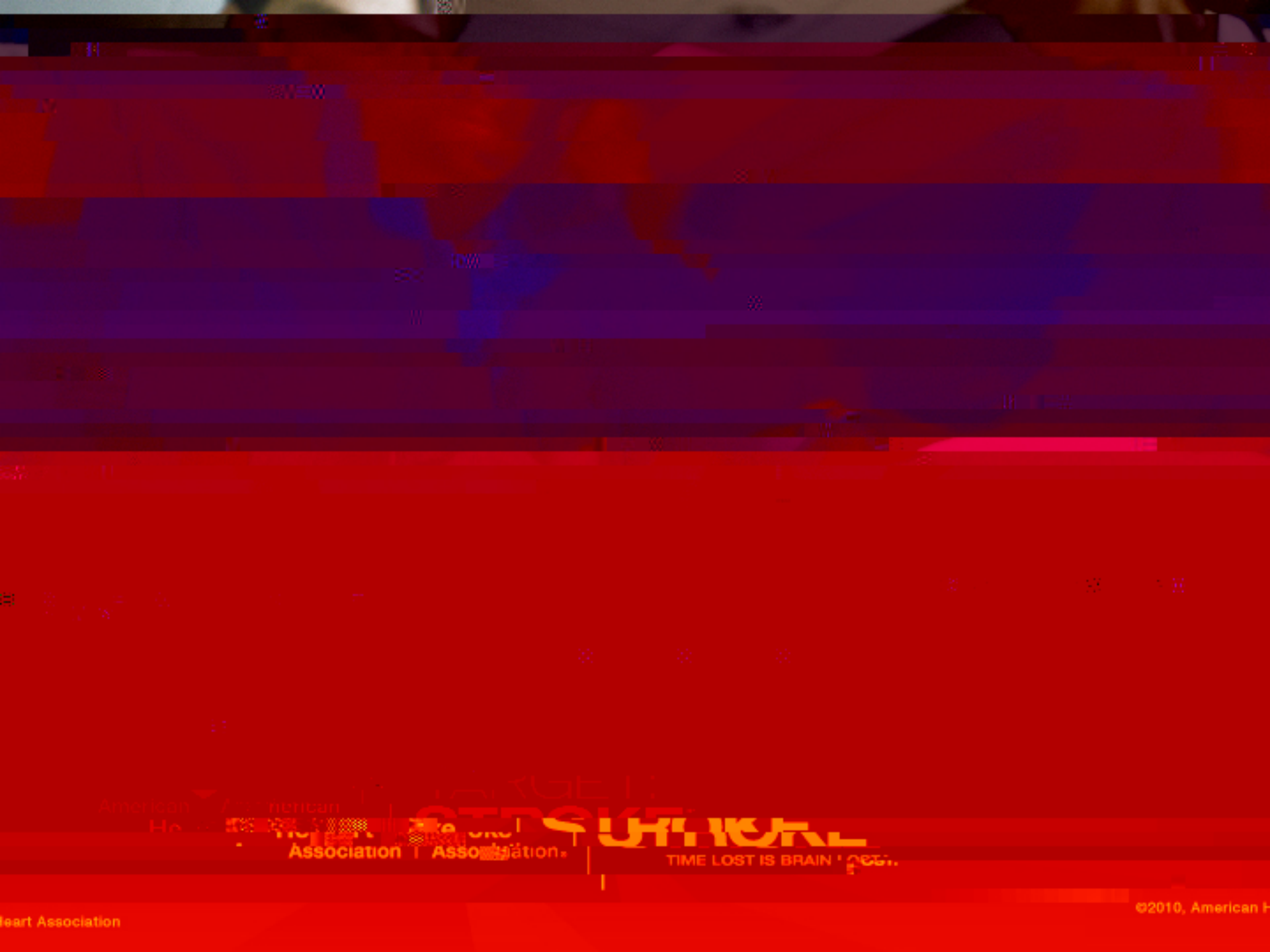
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Association
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