Public Health and Cost Benefits of Successful Reperfusion After Thrombectomy for Stroke

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***Background and Purpose*—**The benefit that endovascular thrombectomy offers to patients with stroke with large vessel occlusions depends strongly on reperfusion grade as defined by the expanded Thrombolysis in Cerebral Infarction (eTICI) scale. Our aim was to determine the lifetime health and cost consequences of the quality of reperfusion for patients, healthcare systems, and society.

***Methods*—**A Markov model estimated lifetime quality-adjusted life years (QALY) and lifetime costs of endovascular thrombectomy–treated patients with stroke based on eTICI grades. The analysis was performed over a lifetime horizon in a United States setting, adopting healthcare and societal perspectives. The reference case analysis was conducted for stroke at 65 years of age. National health and cost consequences of improved eTICI 2c/3 reperfusion rates were estimated. Input parameters were based on best available evidence.

***Results*—**Lifetime QALYs increased for every grade of improved reperfusion (median QALYs for eTICI 0/1: 2.62; eTICI 2a: 3.46; eTICI 2b: 5.42; eTICI 2c: 5.99; eTICI 3: 6.73). Achieving eTICI 3 over eTICI 2b reperfusion resulted on average in 1.31 incremental QALYs as well as healthcare and societal cost savings of $10 327 and $20 224 per patient. A 10% increase in the eTICI 2c/3 reperfusion rate of all annually endovascular thrombectomy–treated patients with stroke in the United States is estimated to yield additional 3656 QALYs and save $21.0 million and $36.8 million for the healthcare system and society, respectively.

***Conclusions*—**Improved reperfusion grants patients with stroke additional QALYs and leads to long-term cost savings. Procedural strategies to achieve complete reperfusion should be assessed for safety and feasibility, even when initial reperfusion seems to be adequate. **(*Stroke*. 2020;51:899-907. DOI: 10.1161/STROKEAHA.119.027874.)**

Key Words: cost savings ■ quality-adjusted life years ■ reperfusion ■ thrombectomy ■ United States

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Stroke is the leading cause of long-term neurological disability and a frequent cause of death worldwide with an annual incidence exceeding 10 million and a prevalence of 42 million.[1] The most detrimental type of ischemic stroke due to large vessel occlusion accounts for just one-third of its incidence yet represents by far the largest contributor to morbidity and mortality.[2] Reperfusion by endovascular thrombectomy (EVT) has recently transformed care for these patients after 7 clinical trials demonstrated substantial benefits in reducing disability.[3–9] EVT has been adopted as standard of care[10] and has been demonstrated to be cost saving in multiple healthcare settings.[11–16]

The achieved grade of reperfusion after EVT is critical in this new era of stroke care. The current American Stroke Association guidelines recommend modified Thrombolysis in Cerebral Infarction (mTICI) grades of 2b or 3 for EVT, with mTICI 2b referring to 50% to 99% reperfusion and mTICI

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3 to 100% reperfusion.[10] However, mTICI 2b is very crude; more granular definitions have been introduced. The expanded TICI (eTICI) classification adds the eTICI 2c category, which marks 90% to 99% reperfusion.[17] Importantly, every lesser grade of reperfusion affected outcomes and increased mortality in a meta-analysis of 7 trials.[18]

The major breakthroughs that drove the success of the pivotal EVT trials in 2015 were faster treatment, patient selection with imaging, and the technical development of third-generation thrombectomy devices in the form of stent retrievers, which significantly increased reperfusion rates and accelerated procedures.[19] To evaluate the potential of further improvement of reperfusion, we sought to define and quantify the long-term health and cost consequences of the achieved grade of eTICI reperfusion for patients with stroke, healthcare systems, and society.

Methods

In support of the Transparency and Openness Promotion Guidelines, the authors offer cost calculations for healthcare systems and societies aside from the United States.[20] Requests that provide a country-specific cost framework are welcomed by the corresponding author. All participants of the meta-analysis provided written informed consent according to each trial protocol, and each study was approved by the local ethics board. The data that support the findings of this study are available from the corresponding author on reasonable request.

Model Structure

We performed quality-adjusted life year (QALY) and cost estimations for the United States adopting the healthcare and societal perspective. We adhered to the recommendations by the Second Panel on Cost-Effectiveness in Health and Medicine[21] and the Consolidated Health Economic Evaluation Reporting Standards[22] statement.

A Markov model was developed using decision-analytic software (TreeAge Pro 2017, version 17.1.1.0; TreeAge, Williamstown/MA). A short-run model was created to analyze costs and functional outcomes within the initial 90 days after the index stroke. Patients enter the model on admission to the hospital for acute ischemic stroke with different grades of reperfusion after EVT and afterward enter one of the 7 health states according to the degree of disability as assessed by the modified Rankin Scale (mRS). The lead analysis was performed for a stroke onset at the age of 65 years. The model does not compare the treatments of EVT versus intravenous thrombolysis nor does it apply to patients that only receive intravenous thrombolysis. A long-run Markov state transition model estimated the expected costs and outcomes over the lifetime of the patient, using a cycle length of 1 year. During each cycle, patients could either remain in the same health state, suffer a recurrent stroke and recover or transit to worse mRS states, or die. Death resulted from age-related mortality rates and the excess mortality rates of stroke survivors. The model structure is shown in Figure 1 (extended Figure I in the online-only Data Supplement). All simulations were carried out over a lifetime horizon (detailed Figure II in the online-only Data Supplement).

Model Input Parameters

The input parameters for the model were based on contemporary EVT trial collaboration data and the most recently published literature providing the best available level of evidence (Table 1).[14,23–36] We accounted for the impact of patients' age on all input parameters based on a recent systematic review.[15]

Probabilities of Clinical Events

The initial probabilities (ie, the probability of entering a specific mRS health state at the end of the initial 90 days) were derived from patients in the intervention arms of the 7 EVT trials within the HERMES trial (Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke) collaboration (Figure 2). The probabilities and 95% CIs for each mRS level in the subgroups of eTICI reperfusion grading were calculated after model adjustment for age, sex, baseline National Institutes of Health Stroke Scale, and time from onset to randomization. The eTICI grades 0 and 1 were merged based on the small sample sizes. The transition probabilities during each annual cycle of the long-run model accounted for remaining in the same health state, the annual recurrent stroke rate, the probability of reentering the same or a lower health state following recurrent stroke, and the annual death rate. The age-specific annual death rate of the general population was drawn from the United States Life Table.[25] The excess death rate of stroke survivors was calculated according to hazard rates by mRS states as reported by contemporary cohort studies.[26]

Costs

Aside from the cumulative lifetime costs, we also calculated the net monetary benefit (NMB) to determine the economic value of care. The NMB combines weighted QALYs and costs into one composite outcome: NMB=([lifetime QALYs×willingness-to-pay]−lifetime costs). A higher NMB indicates a better economic value of care. NMBs were calculated using a willingness-to-pay threshold of $100 000 per QALY.

For the healthcare perspective, direct costs within the first 90 days after stroke and direct annual long-term costs were based

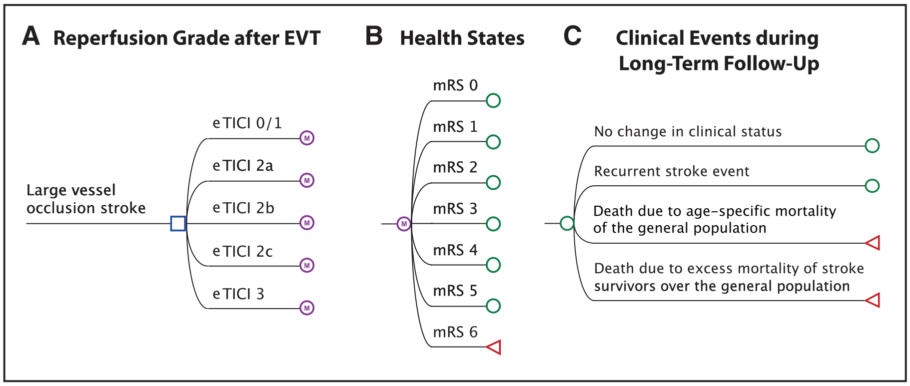

Figure 1. Structure of the Simulation Model on Reperfusion Grade after endovascular thrombectomy (EVT). Shown is the simulation model used to estimate lifetime costs and quality-adjusted life years of patients with stroke with large vessel occlusions depending on the achieved grade of reperfusion after EVT. **A**, Subgroups according to eTICI grading. The blue square indicates the decision node, the point at which reperfusion is decided. In **B**, the purple encircled letter M indicates the Markov node with branches indicating the health states in transition each year. In **C**, the green circle indicates the chance node, after which there is a probability of the occurrence of each event within a cycle, and the red triangle indicates the terminal node, the end of an individual simulation in the model, that is, the death of a patient. eTICI indicates expanded Thrombolysis in Cerebral Infarction; and mRS, modified Rankin Scale.

Table 1. Base-Case Values and Sources of Model Input Parameters

Model Input	Base-Case Value*	Distribution†	Source
Initial probabilities			
For each health state mRS 0-6 of EVT-treated patients	90-day mRS distribution for different eTICI grades	Dirichlet	HERMES (Figure 2)
Transition probabilities			
Recurrent stroke rate	0.059 (for 1st y)	β	Pennlert et al[24]
Annual death rate	0.013 (for 65 y)	β	Arias et al[25]
Annual death hazard rates for survivors mRS 0/1/2/3/4/5	1.53/1.52/2.17/3.18/4.55/6.55	Log normal	Hong et al[26]
After recurrent stroke	control arm	Dirichlet	Goyal et al[23]
Health care costs			
Costs within first 90 days after stroke for mRS 0/1/2/3/4/5/6 (excluding IVT and EVT)	$7996/$11 038/$17 336/$21 440/ $28 729/$34 319/$8067	γ	Dawson et al[27]
Additional cost of IVT treatment	$6961	γ	NIS 2014[28]
Additional cost of EVT treatment	$14 554	γ	Shireman et al[14]
Long-term annual costs after stroke for mRS 0/1/2/3/4/5	$11 245/$11 579/$13 395/$23 009/ $46 553/$68 441	γ	Shireman et al[14]
Recurrent stroke hospitalization	$23 032	γ	Chambers et al[29]
Utilities			
mRS 0/1/2/3/4/5/6	1.00/0.91/0.76/ 0.65/0.33/0.00/0.00	β	Chaisinanunkul et al[30]
Societal costs			
Paid workforce productivity			
Average annual earnings of employed population	$33 000 (for 65 y)	γ	US Census Bureau 2017[31]
Population employment rate	0.312 (for 65 y)	β	US Bureau of Labor Statistics 2017[32]
Relative earnings of stroke survivors	0.825	β	Vyas et al[33]
Return-to-work after stroke mRS 0/1/2/3/4/5	0.63/0.72/0.49/0.19/0.14/0.00	β	Tanaka et al[34]
Unpaid domestic productivity			
Informal annual caregiving costs	mRS 0–1: $1503 mRS 2–5: $7518	γ	Hickenbottom et al[35]

All costs were converted to 2017 USD using the medical care component of the Consumer Price Index.[36] eTICI indicates expanded Thrombolysis in Cerebral Infarction; EVT, endovascular thrombectomy; HERMES, Highly Effective Reperfusion Evaluated in Multiple Endovascular Stroke Trials; IVT, intravenous thrombolysis; mRS, modified Rankin Scale; NIS, National Inpatient Sample; and USD, US dollars.

*The minimum and maximum values for ranges were derived from reported or from calculated 95% CIs with the use of variance estimates as available. The complete list is provided in Table I in the online-only Data Supplement.

†The term distribution refers to the type of distribution of the data input, which is used for sampling in each iteration of the Monte Carlo simulations. This is applied to reflect the uncertainty that is statistically inherent to the data input, which derives from a certain sample size in the above-mentioned studies (referenced in the Source column).

on contemporary data and stratified for each of the 7 mRS health states.[14,27] The costs for EVT were taken from a trial conducted in the United States.[14] All calculations are based on the assumption that the EVT costs are similar for each achieved eTICI grade. The costs for intravenous thrombolysis were taken from the current National Inpatient Sample.[28] All costs were adjusted to 2017 United States Dollars according to the medical care component of the Consumer Price Index[36] and discounted by 3% each year in line with current recommendations.[21] For the societal perspective, we accounted for indirect costs caused by stroke, which were assessed based on the human capital approach. The amount of the societal losses are measured based on the lost productivity due to premature mortality in patients with stroke, the reduced productivity that is caused by the morbidity of stroke survivors, and the costs for informal care given by family members.[21] The detailed methods for societal cost calculations are provided in the online-only Data Supplement.

Utility Values of Health States

Therapy effectiveness was measured using QALY according to current recommendations.[21] QALYs were calculated by multiplying years spent in mRS health states by assigned utility weights. Utility weights were based on a recent consensus analysis.[30,37] Values range from 0.0 to 1.0, with 0.0 representing no and 1.0 representing perfect quality of life. All QALYs were discounted by 3% each year according to current recommendations.[21]

Sensitivity Analyses

To test the robustness of the model prediction, we conducted probabilistic sensitivity analyses, allowing for simultaneous alteration of multiple model input parameters. All input values in the model were varied using distributions that reflect each input parameter's uncertainty as derived from HERMES collaboration outcome data or the literature.

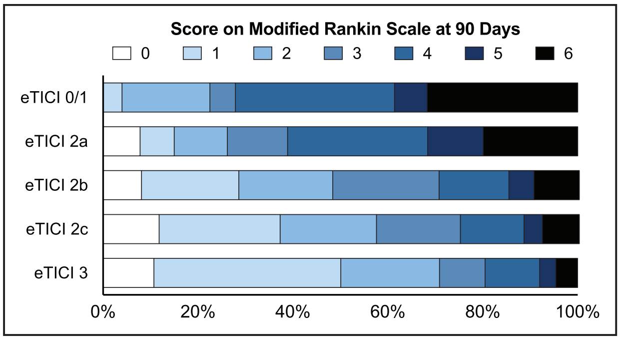

Figure 2. Adjusted 90-day clinical outcome probabilities based on HERMES trial (Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke) data. Shown are the 90-day clinical outcome probabilities of patients with stroke in the intervention arms of the 7-trial HERMES collaboration stratified by the achieved grade of reperfusion after adjustment for age, sex, baseline National Institutes of Health Stroke Scale, and time from symptom onset to randomization. The outcomes are scored on the modified Rankin Scale, with 0 indicating no residual symptoms after stroke and 6 indicating death as a cause of stroke. eTICI indicates expanded Thrombolysis in Cerebral Infarction.

Distributions were calculated using probability density functions appropriate to each parameter, as shown in Table 1 (sensitivity ranges are provided in Table I in the online-only Data Supplement). The probabilistic sensitivity analysis was conducted using 10 000 second order Monte Carlo simulation runs. As this analysis accounts for all uncertainties related to the model, the results are reported as median estimates with 95% prediction intervals. As a hypothetical scenario, we additionally performed a 1-way sensitivity analysis of the cost-effectiveness comparing eTICI 3 and eTICI 2b reperfusion by adding excess EVT procedure costs to achieve eTICI 3 reperfusion (Figure III in the online-only Data Supplement). External model validation was performed using 1-year longitudinal data as reported by the REVASCAT trial (Endovascular Revascularization With Solitaire Device Versus Best Medical Therapy in Anterior Circulation Stroke Within 8 Hours)[38] and 2-year longitudinal data as reported by the MR CLEAN trial (Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in the Netherlands)[39] (Supplementary Methods and Figure IV in the online-only Data Supplement). Table II in the online-only Data Supplement provides lifetime QALY estimates from other published analyses. Checklists are provided in Tables III and IV in the online-only Data Supplement.

Estimation of Population-Level Effects

For population-level effect estimation, the most recently reported annual rate of EVT-treated patients with stroke in the United States population (3.3% of all 692 000 ischemic strokes) was considered to extrapolate patient-level results to national estimates.[40] We set the eTICI 2c/3 reperfusion rate within the HERMES meta-analysis as reference and estimated the benefits of 10%-step increases.

Results

Reference Case Analysis

The reference case analysis was conducted over a lifetime horizon for patients with a large vessel occlusion stroke at 65 years of age. In the probabilistic sensitivity analysis, lifetime QALYs increased for every grade of improved reperfusion (median QALYs for eTICI 0/1: 2.62; eTICI 2a: 3.46; eTICI 2b: 5.42; eTICI 2c: 5.99; eTICI 3: 6.73; Figure 3A). The lifetime healthcare and societal costs decreased for every grade of improved reperfusion from eTICI 2a to eTICI 3 (eg, median healthcare costs for eTICI 2a: $249 019; eTICI 2b: 231 341; eTICI 2c: 225 589; eTICI 3: 220 982; Figure 3B).

The lifetime costs after eTICI 0/1 reperfusion were slightly higher than after eTICI 3 reperfusion (Figure 3B) yet, on average, lower than the other reperfusion grades. This results from the considerably shorter life expectancy of patients with stroke with eTICI 0/1 reperfusion (Figure 3C), by which less costs are accumulated as a consequence. Accounting for costs and QALYs simultaneously, the steady increase in the economic outcome measure NMB illustrates the additional economic value of care that is provided by each higher grade of eTICI reperfusion (Figure 3D).

The advantage of achieving eTICI 3 over eTICI 2b reperfusion resulted in QALY gains of 1.31 (95% prediction interval: 0.43–2.12). Based on the sample sizes in the eTICI subgroups, the 95% prediction intervals of the Monte Carlo simulations are relatively wide, yet on average, eTICI 3 reperfusion compared with eTICI 2b reperfusion is estimated to save $10 327 and $20 224 in healthcare and societal costs per patient treated with EVT (Table 2).

The temporal development of cumulative QALYs, functional independence, mortality, healthcare, and societal costs within the first 20 years after index stroke are provided in Figure II in the online-only Data Supplement.

Population-Level Effect Analysis

Taking a nationwide perspective, a 10% increase in the eTICI 2c/3 reperfusion rate of all annually EVT-treated patients with stroke in the United States is estimated to yield additional 3656 QALYs and save $21.0 million and $36.8 million for the healthcare system and society, respectively (Table 3). A 10% increase in the eTICI 2c/3 reperfusion rate would increase the economic value of care as measured in the NMB by $387 million and $402 million, taking healthcare and societal perspectives, respectively.

Sensitivity Analysis

When comparing eTICI 3 versus eTICI 2b reperfusion, achieving eTICI 3 reperfusion remained the cost saving (ie, dominant) strategy even if additional procedure costs that were needed to hypothetically achieve eTICI 3 after initial eTICI 2b reperfusion amounted to $10 000 per patient (Figure III in the online-only Data Supplement). Achieving eTICI 3 after initial eTICI 2b reperfusion could hypothetically be considered cost-effective even if additional procedure costs of $74 000 or $139 000 were incurred, considering contemporary willingness-to-pay thresholds of $50 000/QALY or $100 000/QALY, respectively.

Discussion

We found that each level of improved reperfusion by EVT in the treatment of patients with stroke with large vessel occlusions within the first 6 hours of symptom onset had a pronounced impact on the patients' lifetime health benefits, the healthcare system, and society. We estimated that eTICI 3 over eTICI 2b reperfusion gains patients around 1.3 additional QALYs and saves around $10 000 in healthcare and $20 000 in societal costs per patient. If the procedure is judged safe and feasible, striving for eTICI 3 reperfusion after initial eTICI 2b reperfusion can be supported economically irrespective of any extra procedural costs that may potentially be generated along the way.

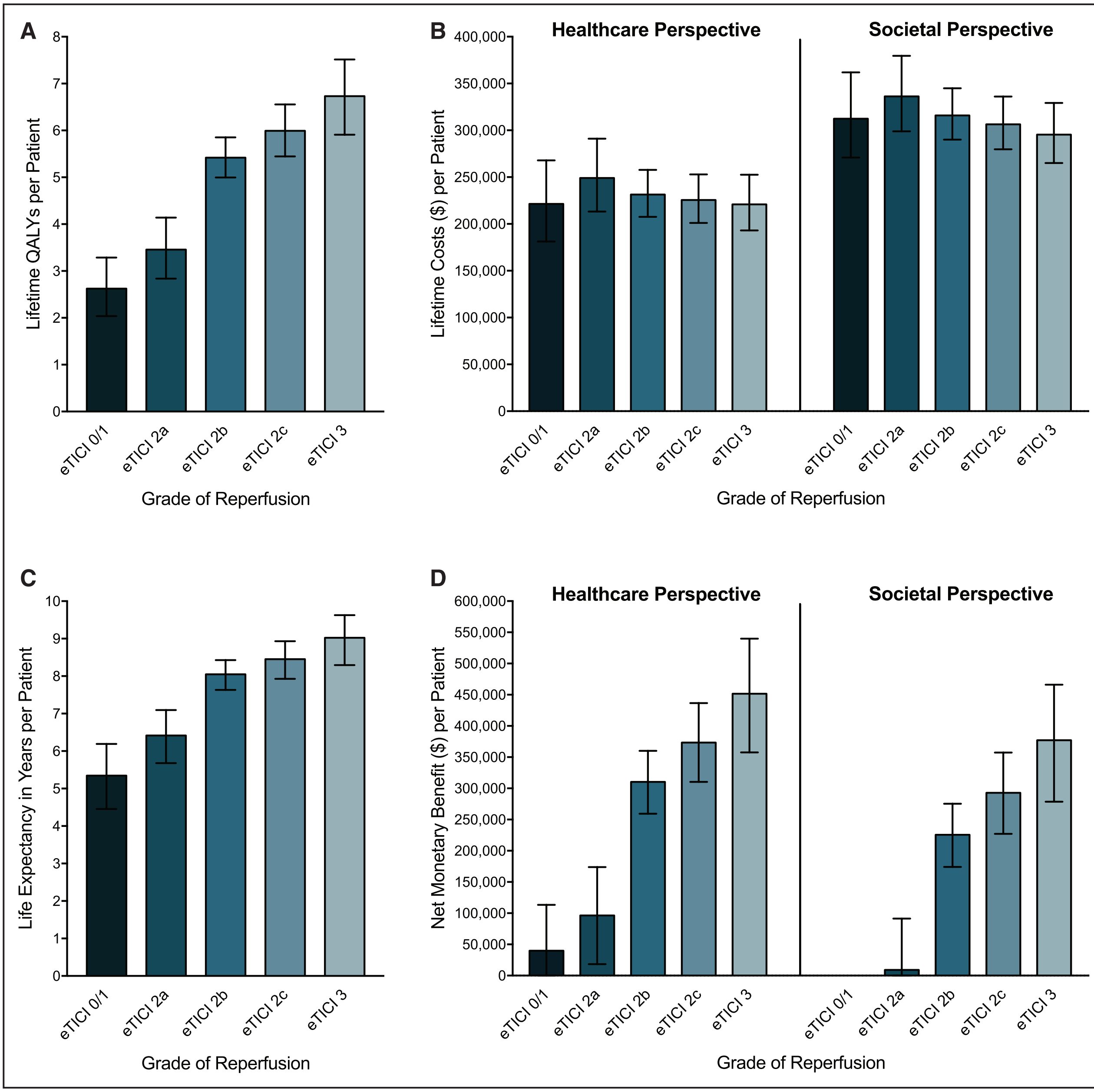

Figure 3. Estimated lifetime health benefit and cost savings of successful reperfusion. **A**, The estimated lifetime quality-adjusted life years (QALYs) for patients with stroke depending on the achieved grade of reperfusion. **B**, The lifetime healthcare costs and societal costs that were achieved per patient. **C**, The life expectancy in years. **D**, The net monetary benefit per patient from healthcare and societal perspectives. The colored bars indicate the median values of the simulations; the error bars indicate the 95% prediction intervals. eTICI indicates expanded Thrombolysis in Cerebral Infarction.

Enhanced reperfusion rates largely explain the success of EVT trials published in 2015 as compared to the 3 preceding neutral trials published in 2013.[19] In these trials, higher rates of reperfusion in the treatment arms were strongly related to improved functional outcomes (as demonstrated in Figure 2). The prior TIMI (Thrombolysis in Myocardial Infarction) outcome measure was redefined to the mTICI definition.[41,42] The recently updated American Stroke Association guidelines provide a Level I recommendation that defines procedural success as mTICI 2b or mTICI 3 reperfusion.[10] Several studies, however, already demonstrated a significant benefit of mTICI 3 over mTICI 2b reperfusion.[43–45]

In addition, emerging evidence supports a redefinition of the crude mTICI 2b category, which encompasses 50% to 99% reperfusion after EVT.[46–48] The subclassification, eTICI 2c reperfusion category, is clearly related to better functional outcomes compared with eTICI 2b.[46–48] This renewed definition of angiographic success of eTICI 2c and eTICI 3 has already been adopted as secondary end point in the recently completed ASTER trial (Interest of Direct Aspiration First Pass Technique for Thrombectomy Revascularisation of Large Vessel Occlusion in Acute Ischaemic Stroke) on thrombectomy technique and the ARISE II trial (Analysis of Revascularization in Ischemic Stroke With EmboTrap) on thrombectomy devices.[49,50] Aside from final reperfusion, the impact of the first pass effect (first pass eTICI 3 reperfusion), which implies faster and more complete reperfusion, has also been demonstrated to be highly relevant for outcomes

Table 2. Lifetime Health and Cost Benefit of Successful Reperfusion

Individual Patient-Level Effects (Median Estimates with 95% Prediction Intervals)					
		Healthcare Perspective		Societal Perspective	
Reperfusion Grade	Δ QALY	Δ Cost ($)	Δ NMB ($)	Δ Cost ($)	Δ NMB ($)
eTICI 2b	Reference*	Reference*	Reference*	Reference*	Reference*
eTICI 2c	+0.57 (0.01 to 1.16)	−5.6K (−24K to 12K)	+63K (−5.8K to 131K)	−9.4K (−30K to 10K)	+68K (−4.1K to 137K)
eTICI 3	+1.31 (0.43 to 2.12)	−10.3K (−36K to 15K)	+142K (41K to 234K)	−20K (−48K to 7K)	+151K (49K to 244K)

Positive ΔQALY values indicate additional QALYs compared with eTICI 2b. Negative ΔCost values indicate cost savings; positive ΔNMB values indicate higher economic value of care compared with eTICI 2b. eTICI indicates expanded Thrombolysis in Cerebral Infarction; K, thousand; NMB, net monetary benefit; and QALY, quality-adjusted life year.

*eTICI 2b was set as the reference point for comparisons of eTICI 2c and eTICI 3. eTICI 2b was selected to reflect the minimum procedural recommendation provided by the 2018 American Stroke Association guideline.

and should be included in the further testing of new devices and techniques.[51]

Although oftentimes procedural success is limited by individual circumstances, secondary improvement of eTICI 2b to eTICI 2c/3 reperfusion has been reported to be safe and feasible.[52] Importantly, patients with secondary achievement of eTICI 2c/3 reperfusion fared equally well as patients with primary eTICI 2c/3.[52] Improved reperfusion leads to health benefits and cost savings. Because the estimated annual financial burden of stroke in the United States accumulates to $40 billion[53] and is projected to triple by 2030,[54] further improvement in reperfusion through procedural strategies or new devices should be encouraged by interventionalists and by the medical industry.

How have reperfusion rates improved over recent years, and what is the potential in real-world practice outside of trials? Across all first successful EVT trials of 2015 and 2016, the meta-analysis of the HERMES collaboration demonstrated a final reperfusion rate of eTICI 2c/3 of 31.4%.[18] In the ASTER trial that compared first-line contact aspiration versus first-line stent-retriever thrombectomy, the final reperfusion rates of eTICI 2c/3 were already 56% for both arms.[50] In the single-armed ARISE II trial, the final reperfusion of eTICI 2c/3 was achieved in 76% of patients.[49] Single-center experiences outside of clinical trials with new EVT techniques even reached final reperfusion eTICI 2c/3 rates of 77% to 80%.[55,56]

Therefore, further dissemination of procedural experience, techniques, and devices bears significant potential to improve the outcome of patients with stroke. Given the estimated cost savings associated with higher rates of reperfusion in this study, financial investments into the training infrastructure, the regional availability of experienced interventionalists and contemporary EVT devices and assist devices (eg, balloon-guided catheters) appear justified as they can be expected to return investment for the healthcare system and society.

There are limitations of our study that need to be taken into account when interpreting the results. First, the cost calculations of the lead analysis were performed under the assumption that procedural costs are equal for different eTICI grades. As procedural success is influenced by a variety of known and unknown factors that make it difficult to control for, we decided to use this unbiased approach to evaluate the implied cost consequences. Furthermore, the procedure costs have an overall minor impact on the lifetime financial burden of ischemic stroke, as shown in sensitivity analysis. Second, the outcome data used for model simulations in this study did not arise under the premise of chasing full reperfusion if initial reperfusion was adequate. Therefore, safety and feasibility have to be addressed in separate studies. Third, the cost calculations were conducted in the United States and the absolute amount cannot be converted to other countries. It has to be kept in mind that United States healthcare expenditures surpass other countries considerably and that the magnitude of cost savings is likely different.[57] Yet, the overall findings of cost savings associated with improved reperfusion may be

Table 3. National Public Health and Cost Benefits of Successful Reperfusion

Annual Population-Level Effects in the United States (Median Estimates)					
		Healthcare Perspective		Societal Perspective	
Rate of eTICI 2c/3 Reperfusion	Δ QALY	Δ Costs ($)	Δ NMB ($)	Δ Costs ($)	Δ NMB ($)
31.4% (HERMES)	Reference*	Reference*	Reference*	Reference*	Reference*
41.4% (+10%)	+3656	−21.0M	+387M	−36.8M	+402M
51.4% (+20%)	+7299	−41.8M	+772M	−73.5M	+803M
61.4% (+30%)	+10941	−62.7M	+1157M	−110.2M	+1204M
71.4% (+40%)	+14583	−84.0M	+1542M	−147.0M	+1605M
81.4% (+50%)	+18225	−104.5M	+1927M	−183.7M	+2006M

Positive ΔQALY values indicate additional QALYs compared with the HERMES rate of eTICI 2c/3 reperfusion. Negative ΔCost values indicate cost savings; positive ΔNMB values indicate higher economic value of care. eTICI indicates expanded Thrombolysis in Cerebral Infarction; HERMES, Highly Effective Reperfusion Across Multiple Endovascular Stroke trials; M, million; NMB, net monetary benefit; and QALY quality-adjusted life year.

*The reperfusion rate in HERMES was arbitrarily set as the reference point for comparisons.

assumed for other care settings; the authors welcome requests providing country-specific cost frameworks and offer calculations of estimated cost savings for other healthcare systems.

In conclusion, improved reperfusion after EVT grants patients with stroke additional QALYs and saves healthcare and societal costs. Procedural strategies and device development to achieve complete reperfusion (eTICI 3) will be cost saving and are justified to harness the full potential of EVT for patients with stroke with large vessel occlusions.

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Disclosures

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