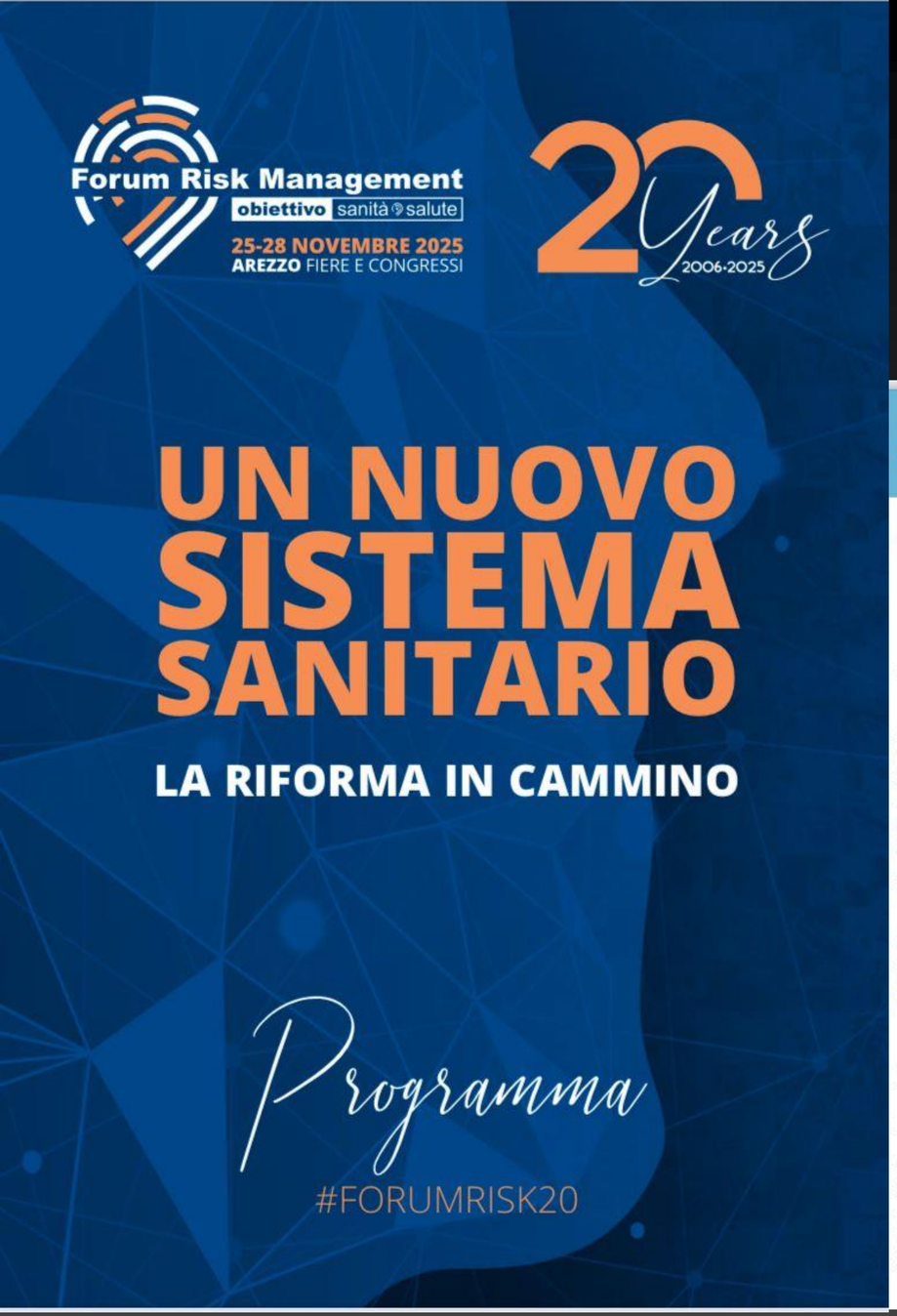
Trombectomia meccanica ed innovazione tecnologica



27 NOVEMBRE | *Sala* **GIOTTO**

09:00 - 13:00 | **IL PERCORSO DELL'ICTUS: ASPETTI MEDICO ORGANIZZATIVI ED IMPATTO ECONOMICO**

in partnership con SCHOOL OF MANAGEMENT UNIVERSITÀ LUM

Coordina
Stefano Moriconi — *Direttore Ufficio 5, Consiglio Superiore di Sanità e Organi Collegiali, Direzione Generale Vigilanza Enti e Organi Collegiali Ministero della Salute*
Maurizio Zanobetti — *Direttore UOC Medicina d'Urgenza e Pronto Soccorso Azienda USL Toscana sud est*

Apertura

Il piano Nazionale ICTUS
Paola Santalucia — *Dirigente medico AO San Giovanni Addolorata – CNCG Istituto Superiore di Sanità*

Tempo, Rete, Vita. La sfida alla morte improvvisa in Italia
Serafina Valente — *Direttore Dipartimento Cardio Toraco Vascolare AOU Senese*

Ictus e stroke unit: aspetti clinici e gestionali di una UOC
Giuseppe Rinaldi — *Direttore Struttura Complessa Neurologia – Stroke Unit, Ospedale "Di Venere" ASL Bari*

Il percorso pre-ospedaliero dell'ictus
Mario Balzanelli — *Presidente SIS 118*

Trombectomia Meccanica e innovazione tecnologica
Vittorio Semeraro — *Direttore AI Radiologia Interventistica Osp. SS Annunziata Taranto e Coordinatore Gruppo Giovani SNO (Scienze Neurologiche Ospedaliere)*

La valutazione economica del DRG 14
Francesco Albergo — *Direttore Area Sanità LUM School of Management*

Data room e business intelligence: leva strategica – data driven per l'ottimizzazione del percorso ictus
Adriano Carenza — *Technology Consulting Ernst & Young Advisory*

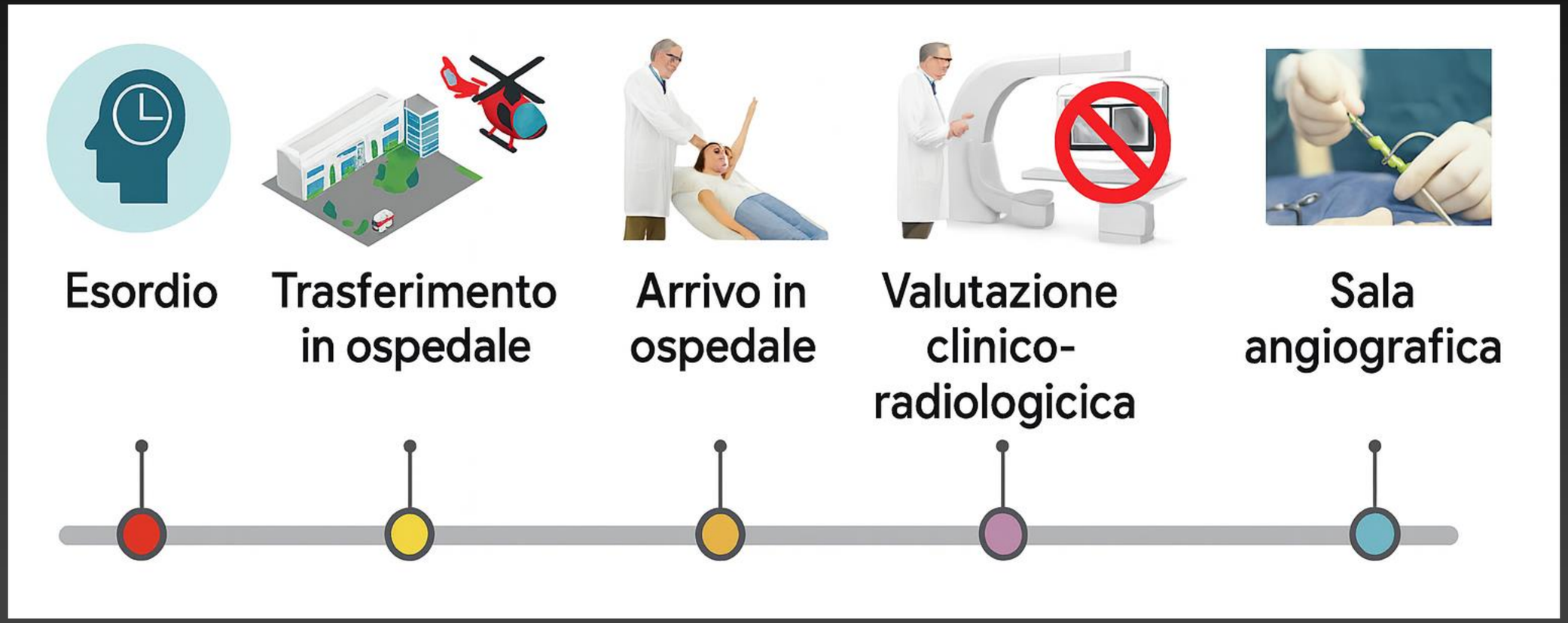
L'innovazione tecnologica che migliora il work flow del paziente con ictus

Intervengono
Andrea Scapigliati — *Presidente Italian Resuscitation Council, Direttore UOC Cardioanestesia e Terapia Intensiva Fondazione Policlinico Universitario Gemelli IRCCS*
Gianfranco Gensini — *Esperto*
Katya Ranzato — *Segretario Nazionale Italian Resuscitation Council, DAPS Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico*
Federico Pecetta — *Azienda USL Toscana sud est*
Piero Coleschi — *Direttore UOC Neurologia Azienda USL Toscana sud est*
Ida Ferraro — *Direttore Amministrativo AORN San Giuseppe Moscati - Avellino*
Michele Giuliani — *Direttore Amministrativo IRCCS - Casa Sollievo della Sofferenza*
Maria Mariani — *Direttore Amministrativo IRCCS CROB*
Daniela Mignone — *Direttore Amministrativo AORN Santobono-Pausilipon*
Alberto Pagliafora — *Direttore Amministrativo AORN Ospedali dei Colli*

Vittorio Semeraro

UOC Radiologia Interventistica ASL Taranto
Coordinatore Gruppo Giovani SNO

Il percorso stroke



Ogni minuto perso equivale a 1,9 milioni di neuroni: come possiamo sfruttare la tecnologia per ridurre il tempo decisionale?

Blockage of one blood vessel will cause ischemia within 5 minutes

Time	Neurons Lost	Synapses Lost	Myelinated fibers Lost	Premature Aging
1 second	32,000	230 million	200 m	8.7 hours
1 minute	1.9 million	14 billion	12 km	3.1 weeks
1 hour	120 million	830 billion	714 km	3.6 years
Complete	1.2 billion	8.3 trillion	7140 km	36 years

TIME IS BRAIN!

Saver JL, Stroke 2006

Mechanical Thrombectomy vs. IV Thrombolysis

2015

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 1, 2015 VOL. 372 NO. 1

A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke

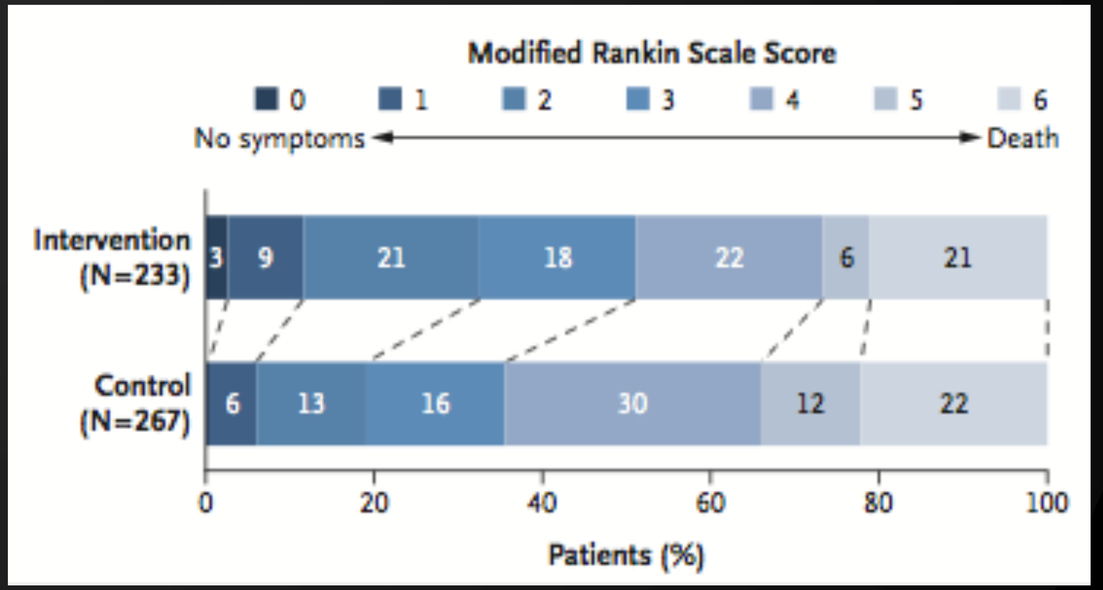
O.A. Berkhemer, P.S.S. Fransen, D. Beumer, L.A. van den Berg, H.F. Lingsma, A.J. Yoo, W.J. Schonewille, J.A. Vos, P.J. Nederkoorn, M.J.H. Wermer, M.A.A. van Walderveen, J. Staals, J. Hofmeijer, J.A. van Oostayen, G.J. Lycklama à Nijeholt, J. Boiten, P.A. Brouwer, B.J. Emmer, S.F. de Bruijn, L.C. van Dijk, L.J. Kappelle, R.H. Lo, E.J. van Dijk, J. de Vries, P.L.M. de Kort, W.J.J. van Rooij, J.S.P. van den Berg, B.A.A.M. van Hasselt, L.A.M. Aerden, R.J. Dallinga, M.C. Visser, J.C.J. Bot, P.C. Vroomen, O. Eshghi, T.H.C.M.L. Schreuder, R.J.J. Heijboer, K. Keizer, A.V. Tielbeek, H.M. den Hertog, D.G. Gerrits, R.M. van den Berg-Vos, G.B. Karas, E.W. Steyerberg, H.Z. Flach, H.A. Marquering, M.E.S. Sprengers, S.F.M. Jenniskens, L.F.M. Beenen, R. van den Berg, P.J. Koudstaal, W.H. van Zwam, Y.B.W.E.M. Roos, A. van der Lugt, R.J. van Oostenbrugge, C.B.L.M. Majoie, and D.W.J. Dippel, for the MR CLEAN Investigators*

CONCLUSIONS

In patients with acute ischemic stroke caused by a proximal intracranial occlusion of the anterior circulation, intraarterial treatment administered within 6 hours after stroke onset was effective and safe. (Funded by the Dutch Heart Foundation and others; MR CLEAN Netherlands Trial Registry number, NTR1804, and Current

MR CLEAN

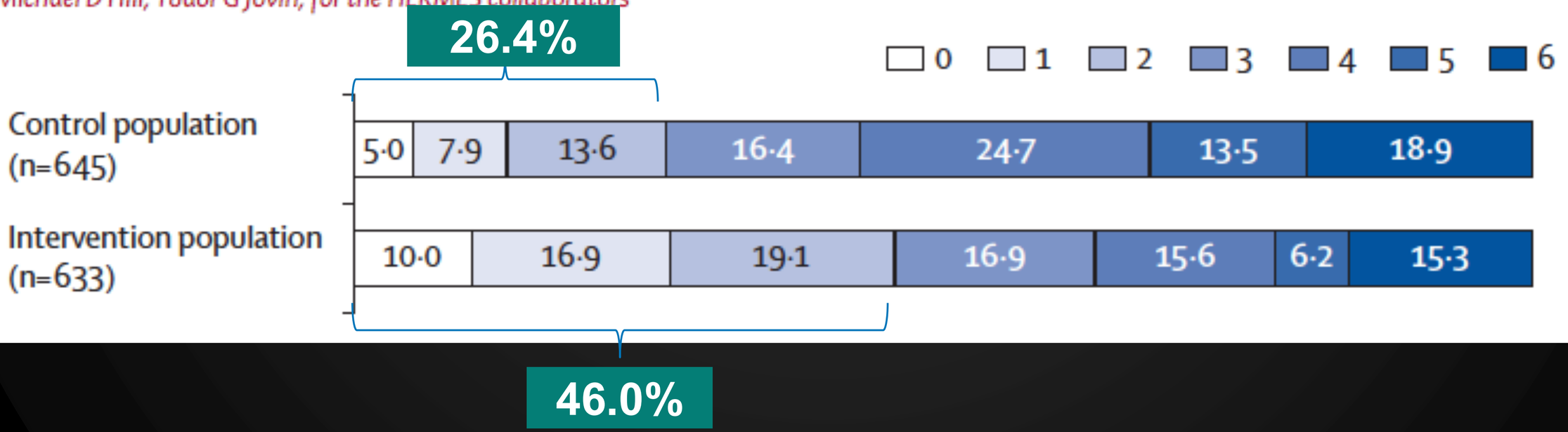
A Multicenter Randomized CLinical trial of Endovascular treatment for Acute ischemic stroke in the Netherlands



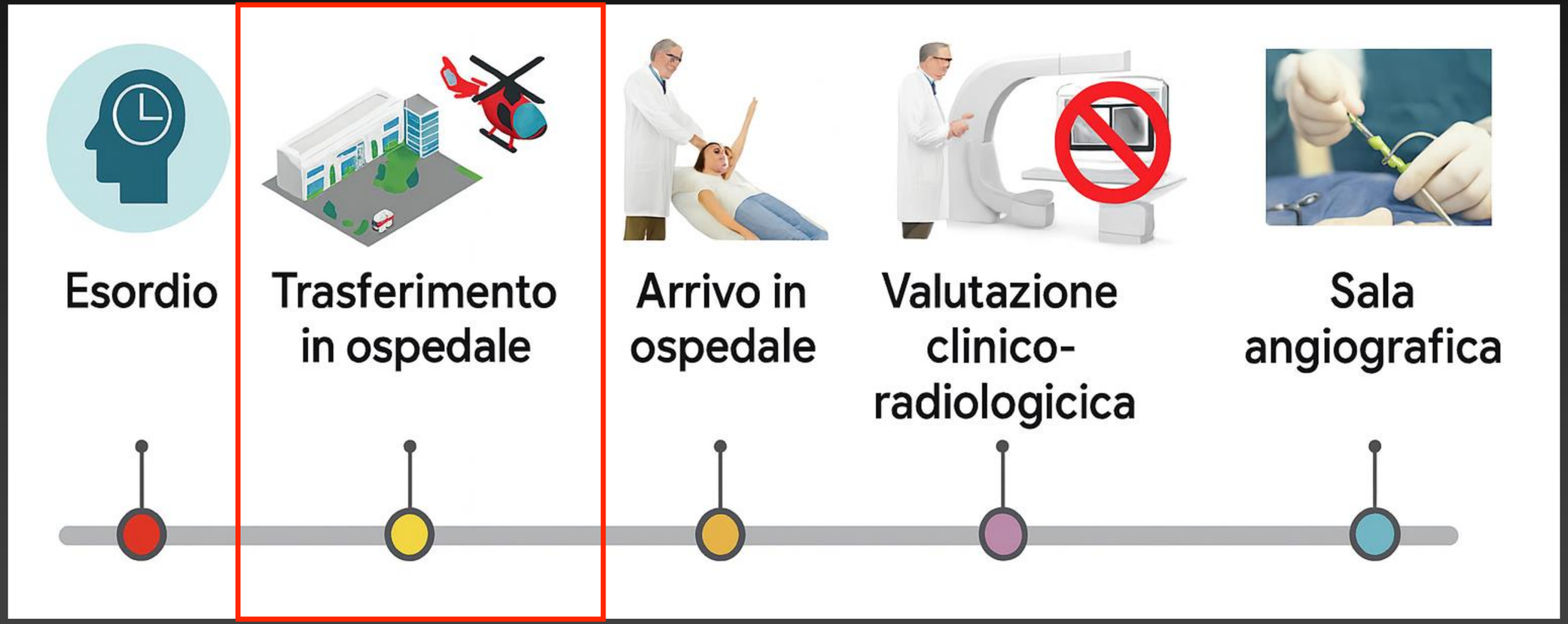
HERMES Meta-analysis

Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials

Mayank Goyal, Bijoy K Menon, Wim H van Zwam, Diederik W J Dippel, Peter J Mitchell, Andrew M Demchuk, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Maria A de Miquel, Geoffrey A Donnan, Yvo B W E M Roos, Alain Bonafe, Reza Jahan, Hans-Christoph Diener, Lucie A van den Berg, Elad I Levy, Olvert A Berkhemer, Vitor M Pereira, Jeremy Rempel, Mònica Millán, Stephen M Davis, Daniel Roy, John Thornton, Luis San Román, Marc Ribó, Debbie Beumer, Bruce Stouch, Scott Brown, Bruce C V Campbell, Robert J van Oostenbrugge, Jeffrey L Saver, Michael D Hill, Tudor G Jovin, for the HERMES collaborators



Il percorso stroke



Ogni minuto perso equivale a 1,9 milioni di neuroni: come possiamo sfruttare la tecnologia per ridurre il tempo decisionale?

Come possiamo innovare (e migliorare) il trasferimento?

Obiettivo del trasferimento è CENTRALIZZARE il Paziente con ictus ischemico acuto nel PRESIDIO PIU’ ADEGUATO per la sua condizione clinica al fine di ottenere la ricanalizzazione nel minor tempo possibile

Come possiamo innovare (e migliorare) il trasferimento?

Trasferimento

Teleconsulto

Mobile Stroke Unit

Come possiamo innovare (e migliorare) il trasferimento?

Trasferimento

Teleconsulto

Mobile Stroke Unit

Tele-stroke pre-ospedaliero

- Videoconsulto in ambulanza: fattibile e affidabile
- Migliora la diagnosi di stroke e l'identificazione LVO rispetto ai soli punteggi paramedici
- Possibile bypass diretto verso centri EVT → riduzione dei tempi
- *Costi bassi, utile in reti regionali con ospedali hub/spoke*

La tele-diagnosi pre-ospedaliera aumenta la precisione del triage e anticipa il percorso corretto del paziente!

Come possiamo innovare (e migliorare) il trasferimento?

Trasferimento

Teleconsulto

Mobile Stroke Unit

Mobile Stroke Unit

- Trial BEST-MSU e B_PROUD: **outcome funzionali migliori a 90 giorni**
- **Door-to-needle ridotto** → più alte percentuali di trombolisi
- Con **CTA on-board**: −~54 minuti al door-to-puncture, EVT più rapido
- *Costi elevati ma costo-efficace in contesti urbani ad alta densità*

The NEW ENGLAND JOURNAL of MEDICINE

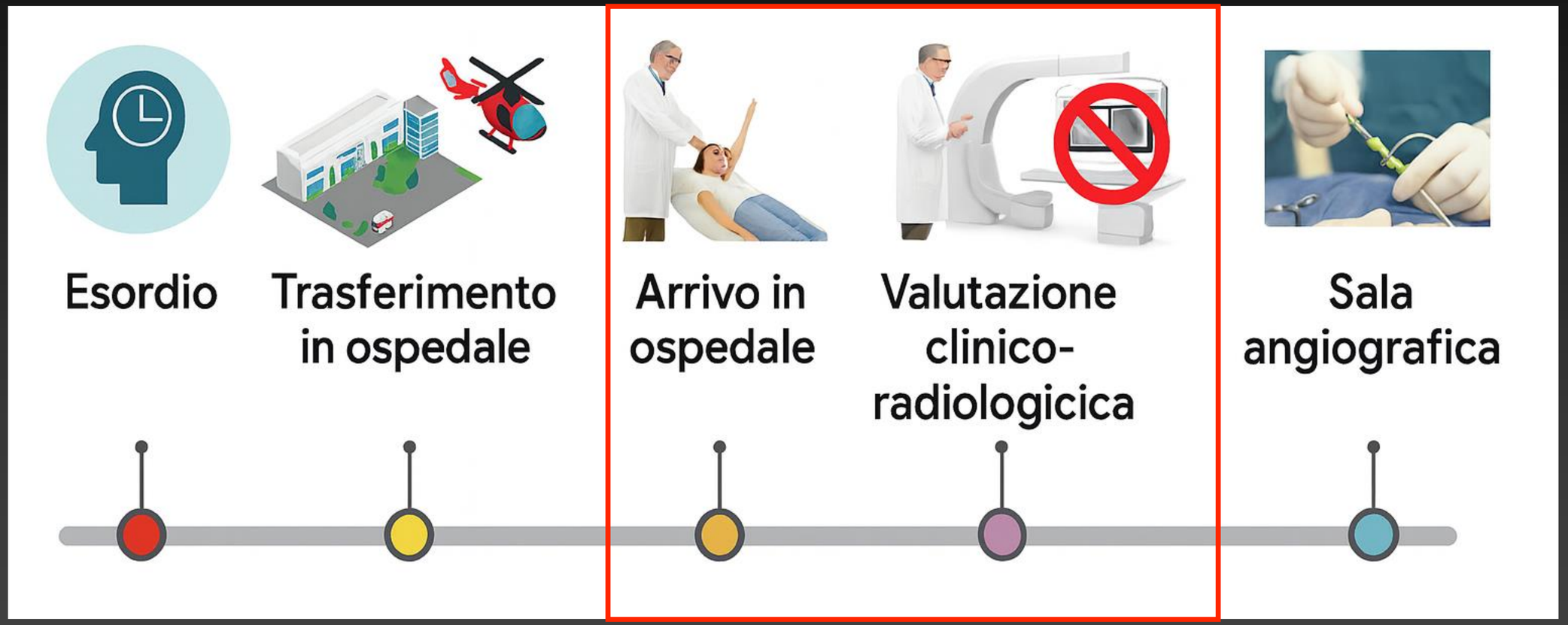
ESTABLISHED IN 1812 SEPTEMBER 9, 2021 VOL. 385 NO. 11

Prospective, Multicenter, Controlled Trial of Mobile Stroke Units

J.C. Grotta, J.-M. Yamal, S.A. Parker, S.S. Rajan, N.R. Gonzales, W.J. Jones, A.W. Alexandrov, B.B. Navi, M. Nour, I. Spokoyny, J. Mackey, D. Persse, A.P. Jacob, M. Wang, N. Singh, A.V. Alexandrov, M.E. Fink, J.L. Saver, J. English, N. Barazangi, P.L. Bratina, M. Gonzalez, B.D. Schimpf, K. Ackerson, C. Sherman, M. Lerario, S. Mir, J. Im, J.Z. Willey, D. Chiu, M. Eisshofer, J. Miller, D. Ornelas, J.P. Rhudy, K.M. Brown, B.M. Villareal, M. Gausche-Hill, N. Bosson, G. Gilbert, S.Q. Collins, K. Silnes, J. Volpi, V. Misra, J. McCarthy, T. Flanagan, C.P.V. Rao, J.S. Kass, L. Griffin, N. Rangel-Gutierrez, E. Lechuga, J. Stephenson, K. Phan, Y. Sanders, E.A. Noser, and R. Bowry

La MSU porta la TAC e la terapia in strada: meno ritardi, più indipendenza a 3 mesi

Il percorso stroke



Ogni minuto perso equivale a 1,9 milioni di neuroni: come possiamo sfruttare la tecnologia per ridurre il tempo decisionale?

Come possiamo innovare il percorso intra-ospedaliero?

Obiettivo è ridurre i tempi di DIAGNOSI e di trattamento di TROMBOLISI (DTN) e di TROMBECTOMIA (DTG)

Shorter Door-to-Needle Times are Associated with Better Outcomes after Intravenous Thrombolytic Therapy and Endovascular Thrombectomy for Acute Ischemic Stroke

Time From Hospital Arrival Until Endovascular Thrombectomy and Patient-Reported Outcomes in Acute Ischemic Stroke

Raed A. Joundi, MD, DPhil[1,2]; Eric E. Smith, MD, MPH[3,4,5]; Aravind Ganesh, MD, DPhil[3,4,5] ; et al

- ⏱️ Ridurre i tempi **door-to-needle (DTN)** e **door-to-groin (DTG)** è associato a un miglior outcome funzionale: ogni **15 minuti di ritardo nel DTN** aumenta la mortalità e riduce l'indipendenza funzionale a 1 anno.
- ⏱️ Ogni **10 minuti di anticipo nella puntura arteriosa** incrementa la probabilità di buon esito (mRS 0–2) del 3–4 % nei pazienti trattati con trombectomia.
- ⏱️ Ogni **15 minuti guadagnati nel DTG** migliorano significativamente la **qualità di vita** a 90 giorni.

Come possiamo innovare il percorso intra-ospedaliero?

Percorso Intraospedaliero

Ottimizzazione della diagnostica
- Software ed IA
- CTA + CTP

Precoce trasferimento in sala angiografica
- Direct to Angio
- Hybrid Angiography

Ottimizzazione dei ruoli
- Simulazioni
- “Root Cause Analysis”

Come possiamo innovare il percorso intra-ospedaliero?

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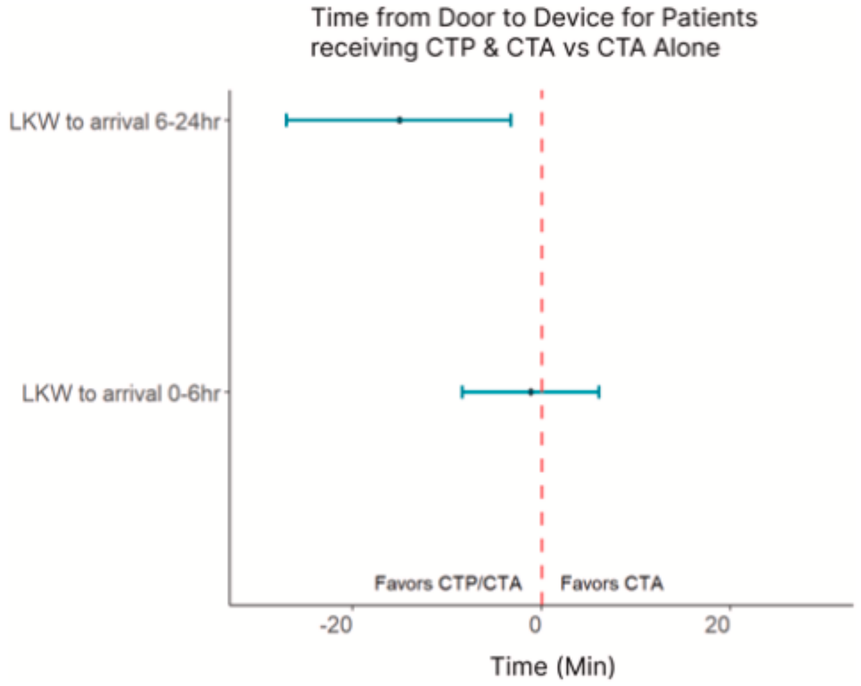
Innoviamo l’imaging e guardiamo al futuro

Contents lists available at ScienceDirect

Journal of Stroke and Cerebrovascular Diseases

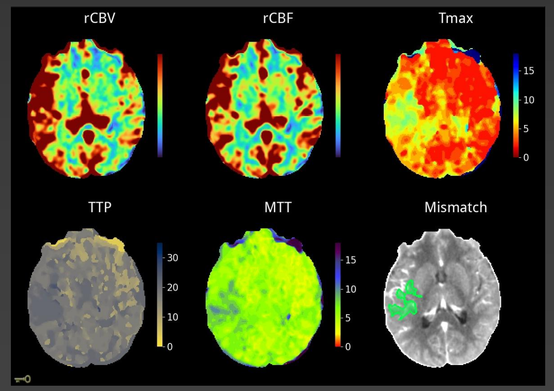
journal homepage: www.elsevier.com/locate/jstroke

Differences in door-to-device times in a retrospective cohort of patients with ischemic stroke who received CTA only or CTA and CTP imaging



Perché sempre l’imaging multimodale?

- Identificazione più rapida dei Mevo
- Riproducibilità ed affidabilità
- Identificazione fast progressor
- *Occlusioni emodinamica*
- *Trombectomia di precisione*



L’imaging multimodale (CTA+CTP) velocizza il work-up diagnostico e terapeutico

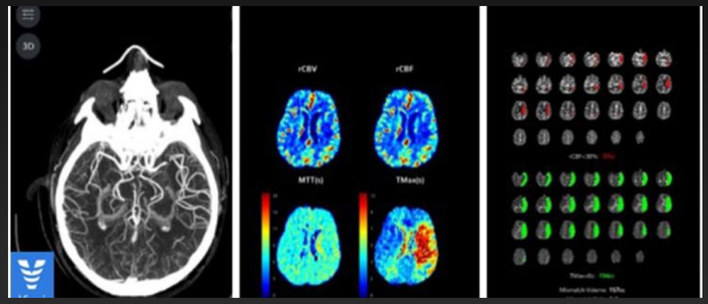
Innoviamo l’imaging e guardiamo al futuro

Systematic Review

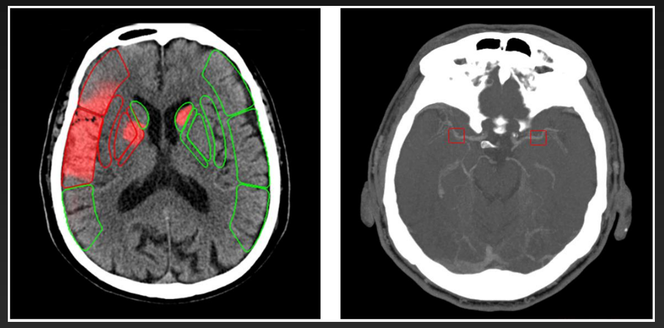
Current Stroke Solutions Using Artificial Intelligence: A Review of the Literature

Omar M. Al-Janabi [1], Amro El Refaei [2], Tasnim Elgazzar [3], Yamama M. Mahmood [4], Danah Bakir [5], Aryan Gajjar [6], Aysha Alateya [7], Saroj Kumar Jha [8], Sherief Ghozy [9], David F. Kallmes [10] and Waleed Brinjikji [10,*]

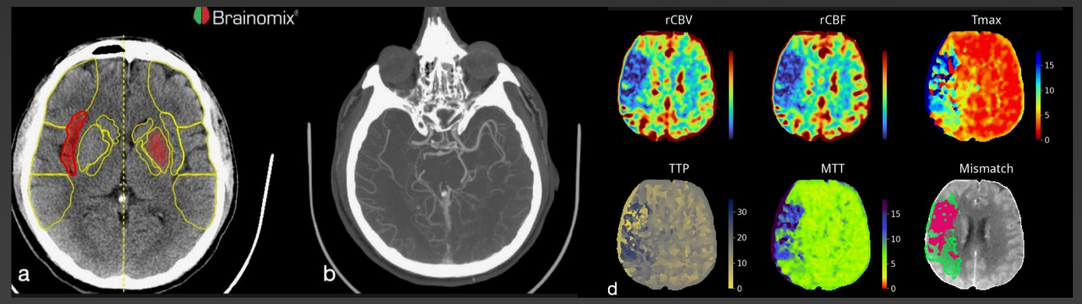
Abstract: Introduction: In recent years, artificial intelligence (AI) has emerged as a transformative tool for enhancing stroke diagnosis, aiding treatment decision making, and improving overall patient care. Leading AI-driven platforms such as RapidAI, Brainomix®, and Viz.ai have been developed to assist healthcare professionals in the swift and accurate assessment of stroke patients. Methods: Following the PRISMA guidelines, a comprehensive systematic review was conducted using PubMed, Embase, Web of Science, and Scopus. Characteristic descriptive measures were gathered as appropriate from all included studies, including the sensitivity, specificity, accuracy, and comparison of the available tools. Results: A total of 31 studies were included, of which 29 studies focused on detecting acute ischemic stroke (AIS) or large vessel occlusions (LVOs), and 2 studies focused on hemorrhagic strokes. The four main tools used were Viz.ai, RapidAI, Brainomix®, and deep learning modules. Conclusions: AI tools in the treatment of stroke have demonstrated usefulness for diagnosing different stroke types, providing high levels of accuracy and helping to make quicker and more precise clinical judgments.



Viz AI



Rapid



Brainomix

L’IA riduce i tempi DTN e DTG ma anche i tempi di trasferimento Spoke-HUB

Come possiamo innovare il percorso intra-ospedaliero?

Percorso Intraospedaliero

Ottimizzazione della diagnostica
- Software ed IA
- CTA + CTP

Precoce trasferimento in sala angiografica
- Direct to Angio
- Hybrid Angiography

Ottimizzazione dei ruoli
- Simulazioni
- “Root Cause Analysis”

E se andassimo direttamente in sala angiografica?

Stroke

TOPICAL REVIEW

Section Editors: Bruce C.V. Campbell, MBBS, BMedSc, PhD, and Ashutosh P. Jadhav, MD, PhD

Direct Transfer to the Neuroangiography Suite for Patients With Stroke

Shashvat M. Desai, MD; Marios Psychogios, MD; Pooja Khatri, MD; Tudor G. Jovin, MD; Ashutosh P. Jadhav, MD, PhD

JAMA Neurology

JAMA Neurol. 2021 Aug; 78(8): 916–926. PMCID: PMC8204255
Published online 2021 Jun 14. doi: 10.1001/jamaneurol.2021.1707 PMID: 34125153

Direct to Angiography vs Repeated Imaging Approaches in Transferred Patients Undergoing Endovascular Thrombectomy

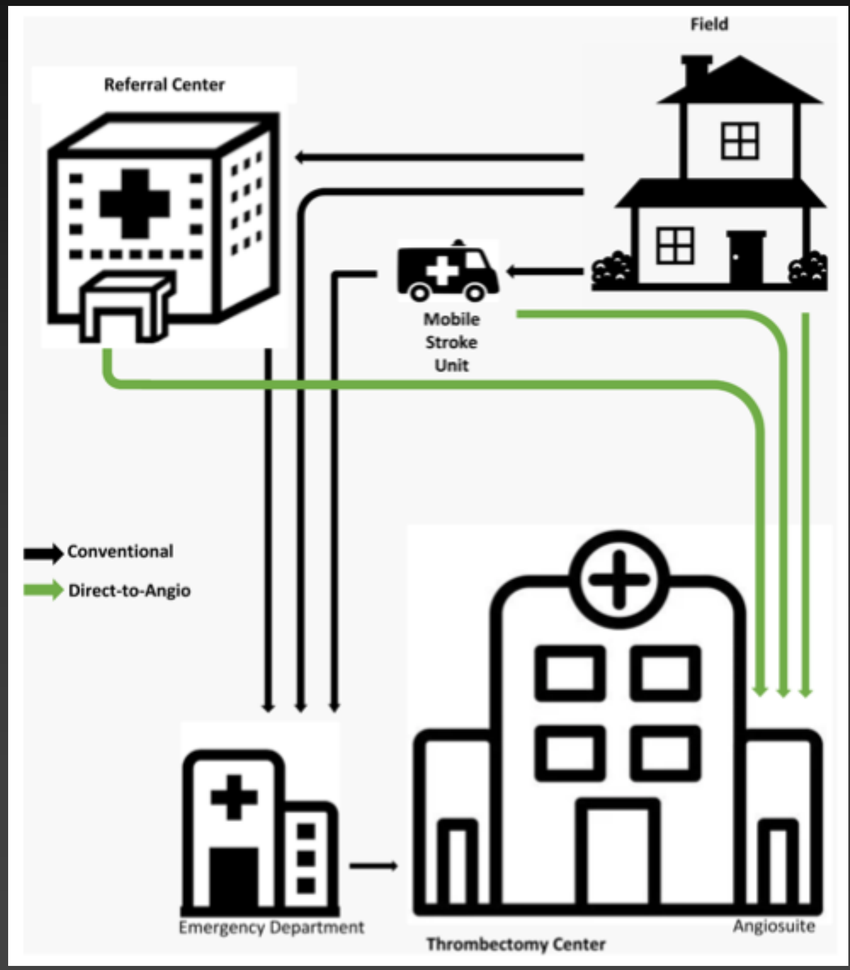
Amrou Sarraj, MD,[✉1] Nitin Goyal, MD,[2,3] Michael Chen, MD,[4] James C. Grotta, MD,[5] Spiros Blackburn, MD,[6] Manuel Requena, MD,[7] Haris Kamal, MD,[8] Michael G. Abraham, MD,[9] Lucas Elijovich, MD,[2,3] Mark Dannenbaum, MD,[6] Osman Mir, MD,[10] Wondwossen G. Tekle, MD,[11] Deep Pujara, MBBS, MPH,[1] Faris Shaker, MBChB,[1] Chunyan Cai, PhD,[12] Laith Maali, MD,[9] Yazan Radaideh, MD,[4] Sujan Teegala Reddy, MD,[13] Kaushik Niranjan Parsha, MD,[3] Bader Alenzi, MD,[14] Mohammad Ammar Abdulrazzak, MD,[1] Jonathan Greco, DO,[1] Daniel Hoit, MD,[3] Sheryl B. Martin-Schild, MD,[15] Sarah Song, MD, MPH,[4] Clark Sitton, MD,[16] Georgios K. Tsivgoulis, MD,[2,17] Andrei V. Alexandrov, MD,[2] Adam S. Arthur, MD, MPH,[2,3] Arthur L. Day, MD,[6] Ameer E. Hassan, DO,[11] and Marc Ribo, MD[7]

Meta-Analysis > Stroke. 2022 Aug;53(8):2478-2487. doi: 10.1161/STROKEAHA.121.038221. Epub 2022 May 20.

Direct to Angiosuite Versus Conventional Imaging in Suspected Large Vessel Occlusion: A Systemic Review and Meta-Analysis

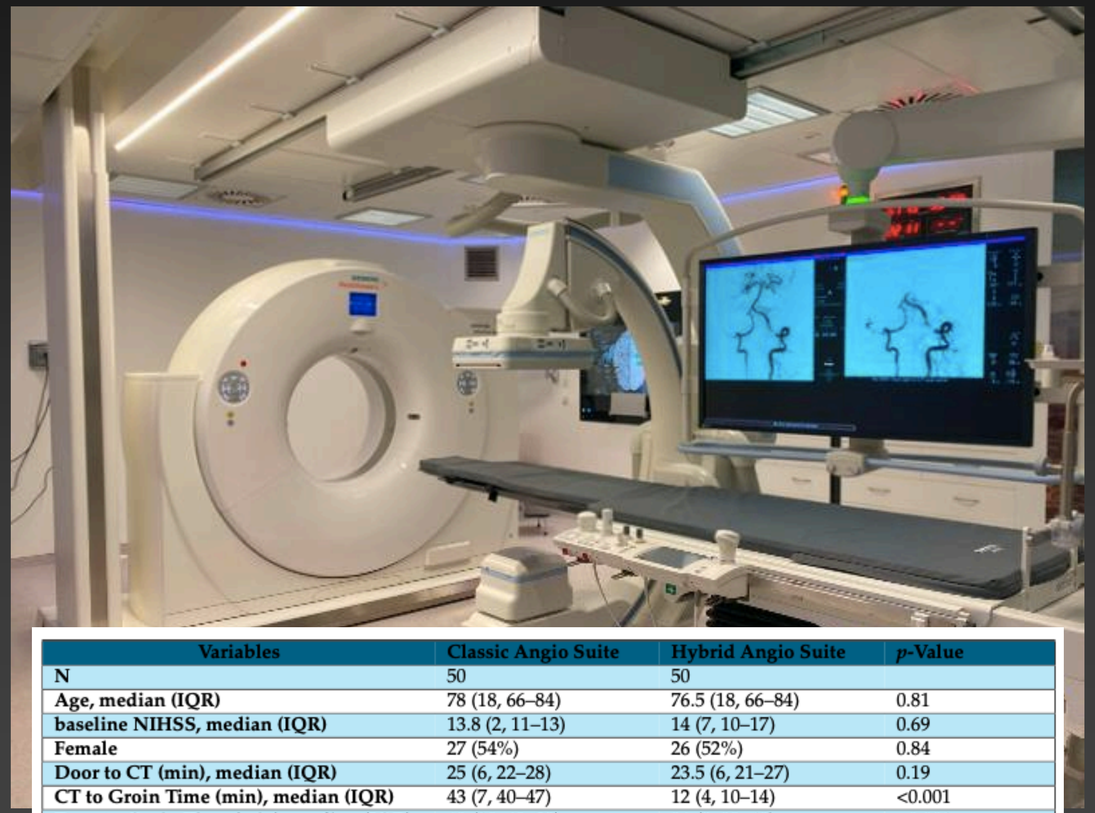
Mahmoud H Mohammaden [1,2], Mohamed Fahmy Doheim [3], Mohamed Elfil [4], Alhamza R Al-Bayati [1,2], Agostinho Pinheiro [1,2], Thanh N Nguyen [5], Nirav R Bhatt [1,2], Diogo C Haussen [1,2], Raul G Nogueira [1,2]

- Ridotto DTG
- Miglior outcome a 90 giorni
- Necessita di Mobile Stroke Unit



Il modello "Direct to Angio" riduce significativamente il tempo DTG!

E se la TC fosse in sala angiografica?



Variables	Classic Angio Suite	Hybrid Angio Suite	*p*-Value
N	50	50	
Age, median (IQR)	78 (18, 66–84)	76.5 (18, 66–84)	0.81
baseline NIHSS, median (IQR)	13.8 (2, 11–13)	14 (7, 10–17)	0.69
Female	27 (54%)	26 (52%)	0.84
Door to CT (min), median (IQR)	25 (6, 22–28)	23.5 (6, 21–27)	0.19
CT to Groin Time (min), median (IQR)	43 (7, 40–47)	12 (4, 10–14)	<0.001
Door to Groin Time (min), median (IQR)	69 (10, 63–73)	36 (8, 32–40)	<0.001
Occlusion Site			0.62

Hybrid CT Angio Suite for Acute Ischemic Stroke: A New Time-Saving Workflow Model?

Pietro Trombatore [1,*], Simone Cottonaro [1], Iacopo Valente [2], Emilio Lozupone [3], Luigi Della Gatta [4], Alfio Cannella [1], Clara Di Lorenzo [1], Antonio Ragusa [1], Luca Mammino [1] and Gianluca Galvano [1]

Abstract: Objectives: Explore the effect of the introduction of a hybrid CT angio suite on the in-hospital workflow time of patients with acute ischemic stroke. **Methods:** This was a retrospective observational case-control study. All consecutive patients admitted to our emergency department with suspected ischemic stroke who underwent stroke imaging and mechanical thrombectomy (MT) in the new hybrid CT angio suite from October 2023 to March 2024 were included in the study. The primary outcome was the evaluation of in-hospital workflow times by the assessment of both the time from hospital admission to the beginning of the endovascular treatment (door-to-groin time, DTG) and the time from the interpretation of imaging to arterial puncture (CT-to-groin time, CTTG). The secondary aim was the evaluation of the clinical outcome through the evaluation of the mRS at 3 months. These data were compared to the control group. **Results:** Between October 2023 and March 2024, 50 consecutive patients with suspected ischemic stroke underwent neuroimaging and MT in the hybrid CT angio suite. We observed a significant reduction of the median DTG time from 71 min to 36 min ($p < 0.001$) and the median CT-to-groin time from 44 min to 12 min ($p < 0.001$) compared to the control group. **Conclusions:** The introduction of the hybrid CT angio suite dedicated to acute ischemic stroke has definitely reduced in-hospital delays, allowing better management of these patients.

La TC in sala angiografica riduce significativamente il tempo DTG!

Come possiamo innovare il percorso intra-ospedaliero?

Percorso Intraospedaliero

Ottimizzazione della diagnostica
- Software ed IA
- CTA + CTP

Precoce trasferimento in sala angiografica
- Direct to Angio
- Hybrid Angiography

Ottimizzazione dei ruoli
- Simulazioni
- “Root Cause Analysis”

Modelli e simulazione per “innovare” il percorso stroke

Analisi del processo:
• Root Cause Analysis (RCA): Identificare le cause principali dei ritardi → Correzione mirata
• Failure Mode & Effects Analysis (FMEA): Valutazione dei rischi → Maggior affidabilità
• Value Stream Mapping (Lean): Mappare il flusso → Riduzione dei tempi medi

Modellazione e simulazione:
• Discrete Event Simulation (DES): Testare scenari 'what if' → DTN ↓ fino al 25%
• Process Mining: Analizzare i log reali → Identificare varianti lente
• System Dynamics / Agent-Based Models: Studiare interazioni complesse → Pianificazione efficiente

Risultati attesi:
• Riduzione Door-to-Treatment (−20÷40%)
• Standardizzazione del workflow
• Decisioni basate su dati reali e predittivi

RESEARCH Open Access

Evaluating the effects of simulation training on stroke thrombolysis: a systematic review and meta-analysis

Sameera Aljuwaiser[3], Abdel Rahman Abdel-Fattah[1], Craig Brown[2,3], Leia Kane[2,3], Jamie Cooper[2,3] and Alyaa Mostafa[3*]

Abstract

Background Ischaemic strokes are medical emergencies, and reperfusion treatment, most commonly intravenous thrombolysis, is time-critical. Thrombolysis administration relies on well-organised pathways of care with highly skilled and efficient clinicians. Simulation training is a widespread teaching modality, but results from studies on the impact of this intervention have yet to be synthesised. This systematic review and meta-analysis aimed to synthesise the evidence and provide a recommendation regarding the effects of simulation training for healthcare professionals on door-to-needle time in the emergency thrombolysis of patients with ischaemic stroke.

Methods Seven electronic databases were systematically searched (last updated 12th July 2023) for eligible full-text articles and conference abstracts. Results were screened for relevance by two independent reviewers. The primary outcome was door-to-needle time for recombinant tissue plasminogen activator administration in emergency patients with ischaemic stroke. The secondary outcomes were learner-centred, improvements in knowledge and communication, self-perceived usefulness of training, and feeling 'safe' in thrombolysis-related decision-making. Data were extracted, risk of study bias assessed, and analysis was performed using RevMan™ software (Web version 5.6.0, The Cochrane Collaboration). The quality of the evidence was assessed using the Medical Education Research Study Quality Instrument.

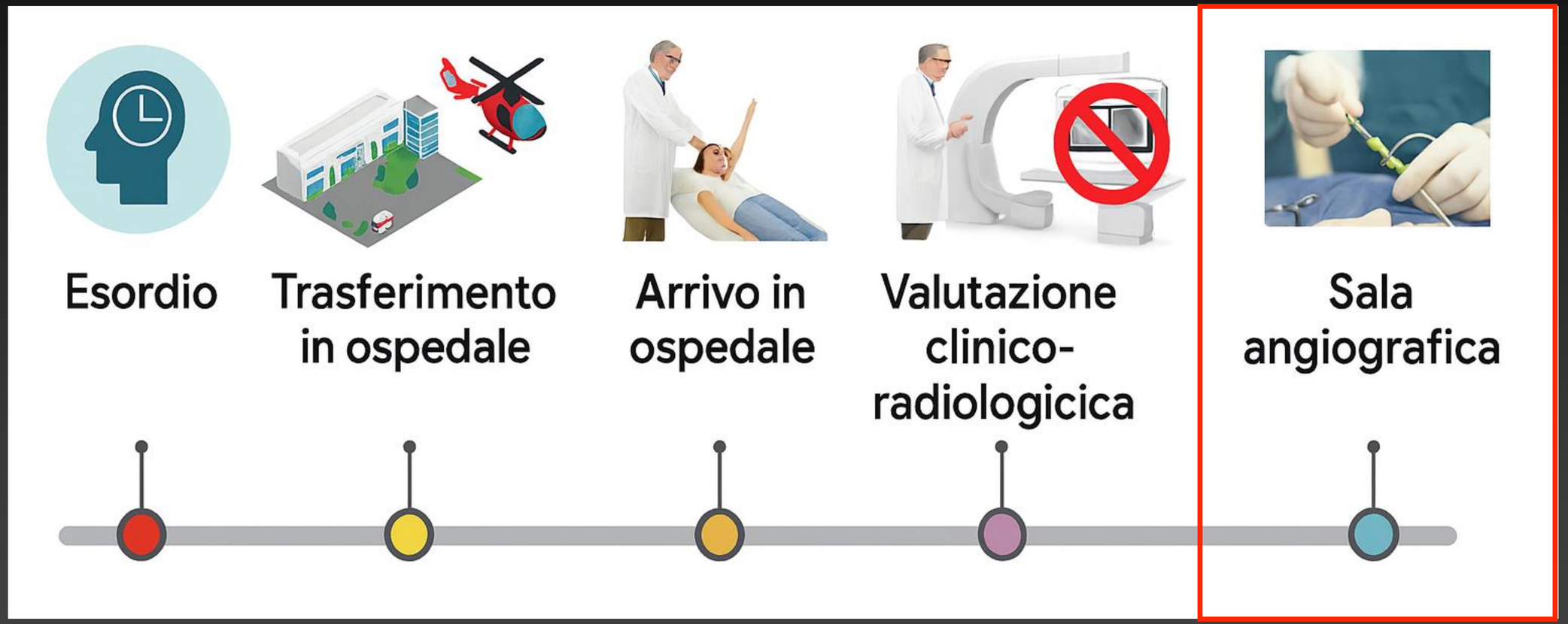
Results Eleven studies were included in the meta-analysis and nineteen in the qualitative synthesis ($n = 20{,}189$ total patients). There were statistically significant effects of simulation training in reducing door-to-needle time; mean difference of 15 min [95% confidence intervals (CI) 8 to 21 min]; in improving healthcare professionals' acute stroke care knowledge; risk ratio (RR) 0.42 (95% CI 0.30 to 0.60); and in feeling 'safe' in thrombolysis-related decision-making; RR 0.46 (95% CI 0.36 to 0.59). Furthermore, simulation training improved healthcare professionals' communication and was self-perceived as useful training.

Conclusion This meta-analysis showed that simulation training improves door-to-needle times for the delivery of thrombolysis in ischaemic stroke. However, results should be interpreted with caution due to the heterogeneity of the included studies.

Keywords Simulation training, Door-to-needle time, Ischaemic stroke, Review

“Non si migliora ciò che non si misura: il modello è la base della simulazione, la simulazione è la base del miglioramento.”

Il percorso stroke

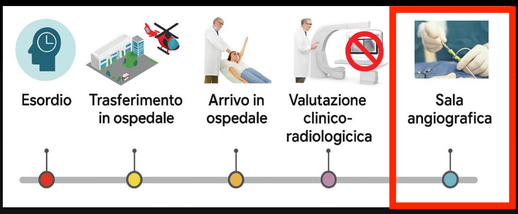


Ogni minuto perso equivale a 1,9 milioni di neuroni: come possiamo sfruttare la tecnologia per ridurre il tempo decisionale?

Come possiamo innovare (e migliorare) la trombectomia meccanica?

Obiettivo del trattamento endovascolare è ottenere la ricanalizzazione nel MINOR TEMPO possibile ottimizzando EFFICACIA e SICUREZZA del trattamento

Innovazione tecnologica in sala angiografica



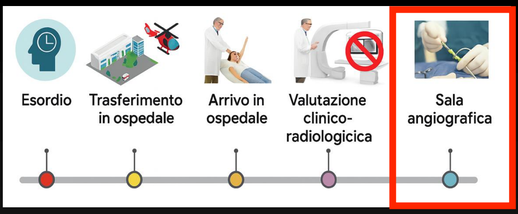
Sala angiografica

Implementazione Software e Hardware

Innovazione Tecnologica dei Device

Trombectomia Robotica da Remoto

Innovazione tecnologica in sala angiografica



Sala angiografica

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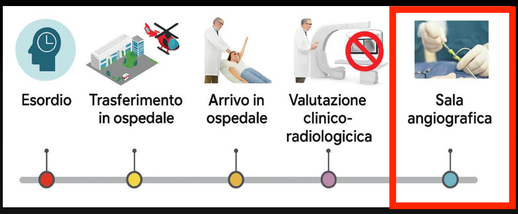


Hybrid CT Angio Suite for Acute Ischemic Stroke: A New Time-Saving Workflow Model?

Pietro Trombatore [1,*], Simone Cottonaro [1], Alfio Cannella [1], Clara Di Lorenzo [1], Antonio R

Section Editors: Bruce C.V. Campbell, MBBS, BMedSc, PhD, and Ashutosh P. Jadhav, MD, PhD

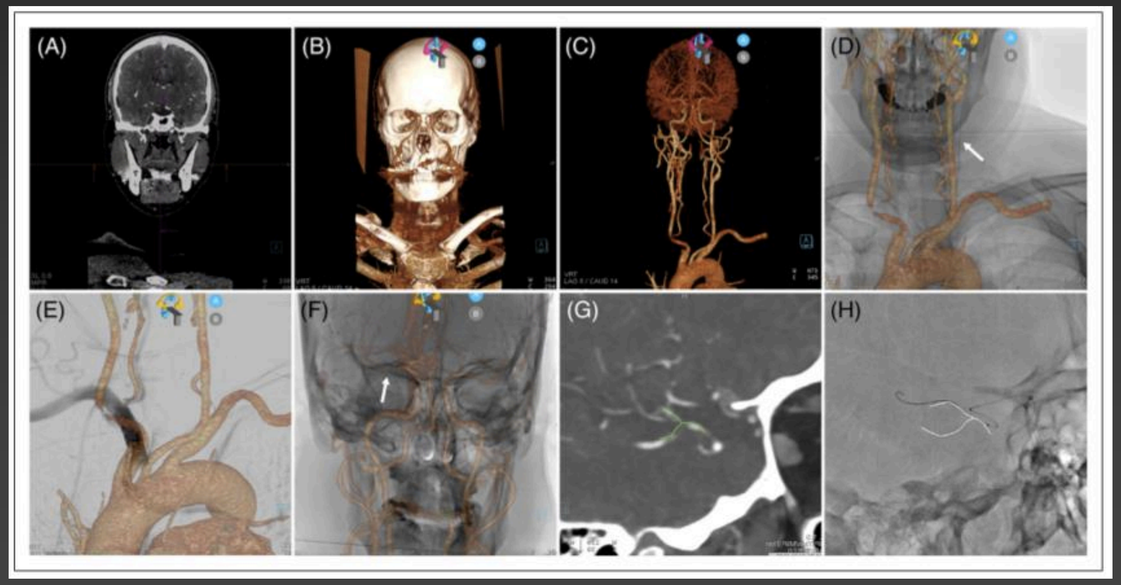
Direct Transfer to the Neuroangiography Suite for Patients With Stroke

Shashvat M. Desai, MD; Marios Psychogios, MD; Pooja Khatri, MD

ORIGINAL RESEARCH

Fusion Imaging in Endovascular Thrombectomy for Acute Ischemic Stroke

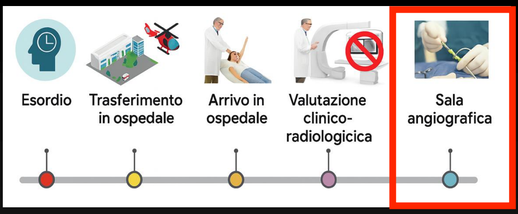
Lovisa Landström, MD; Emma Hall, MD; Björn M Hansen, MD, PhD; Johan Wassélius, MD, PhD



- Aumenta il tasso di ricanalizzazione
- Aumenta il First Pass Effect
- Riduce il Time-to-Recanalizzatioon

La sala angiografica del futuro è un ecosistema integrato che unisce imaging avanzato, intelligenza artificiale e competenze multidisciplinari!

Innovazione tecnologica in sala angiografica



Sala angiografica

Implementazione Software e Hardware

Innovazione Tecnologica dei Device

Trombectomia Robotica da Remoto

La trombectomia assistita da Robot

First-In-Human Robot-Assisted Stroke Thrombectomy

Anthony S. Kim, MD, reviewing Yang M et al. JAMA Neurol 2025 Apr 7

In the 10 patients treated, robot-assisted thrombectomy achieved recanalization and had no periprocedural complications.

Technological advances have facilitated the application of robotic surgery systems to an ever-expanding list of procedures. These systems consist of a robotic arm/actuator in the operating room to execute precise movements, a console outside the operating room to control the robotic arm's movements while reducing radiation exposure for fluoroscopy, and a viewscreen for navigation and visualization of anatomic structures. Now, researchers report a first-in-human trial of robot-assisted stroke thrombectomy in 10 patients with acute anterior-circulation large-vessel occlusion stroke from October 2023 to June 2024 at one center in China. Femoral artery puncture and preparation of the microguidewire, microcatheter, aspiration catheter, and stent retriever were performed manually, but the thrombectomy itself was performed without further manual intervention.

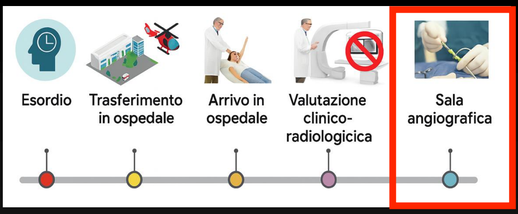
Seven patients achieved the exploratory primary clinical endpoint of a favorable clinical outcome (modified Rankin Scale score ≤2) at 90 days. The exploratory primary technical endpoint, procedure success without manual intervention, occurred in all patients. Complete recanalization occurred in 8 patients. There were no periprocedural complications and, as expected, radiation exposures were significantly lower at the control console than inside the angiography suite.

FIG 1. A benchtc … *arrowhead*), and MT was perform…

(The letter indicates study funding by grants from the Beijing National Natural Science Foundation and National Natural Science Foundation of China, but the study's clinicaltrials.gov entry lists the private manufacturer of the robotic system as the study sponsor.)

La robotica migliorerà il trattemento endovascolare come è avvenuto in altre branche…?

Innovazione tecnologica in sala angiografica



Sala angiografica

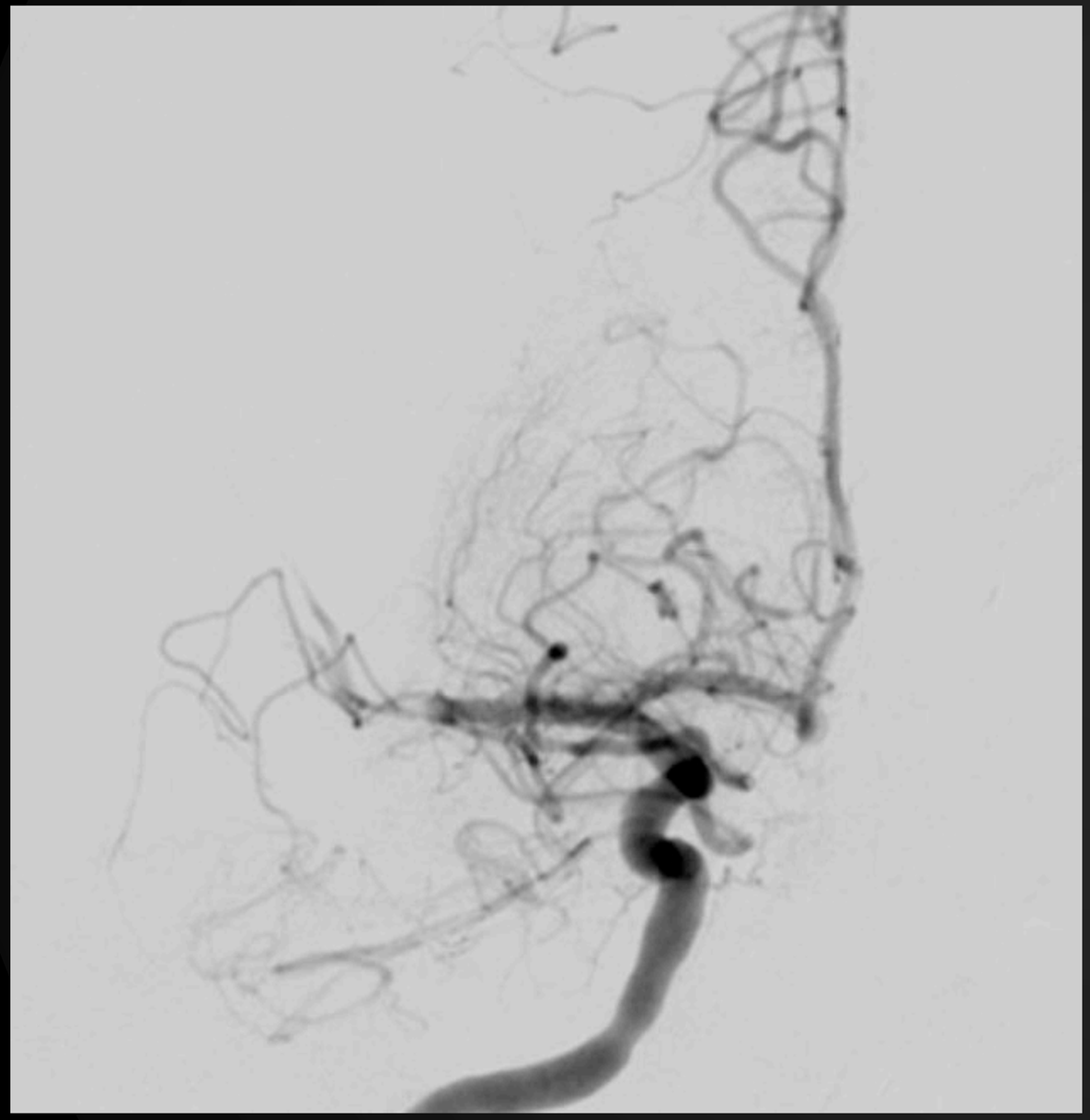
Implementazione Software e Hardware

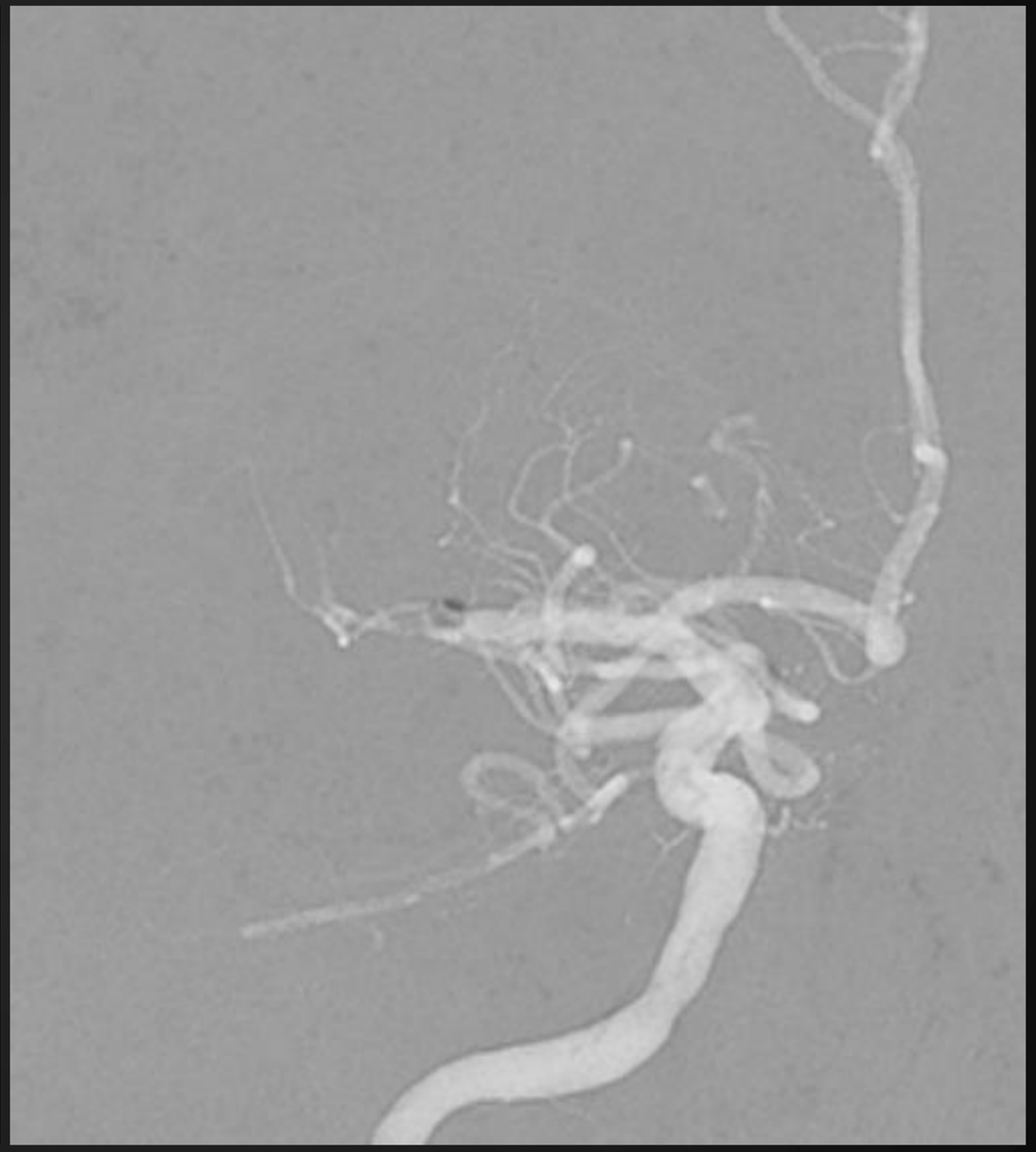
Innovazione Tecnologica dei Device

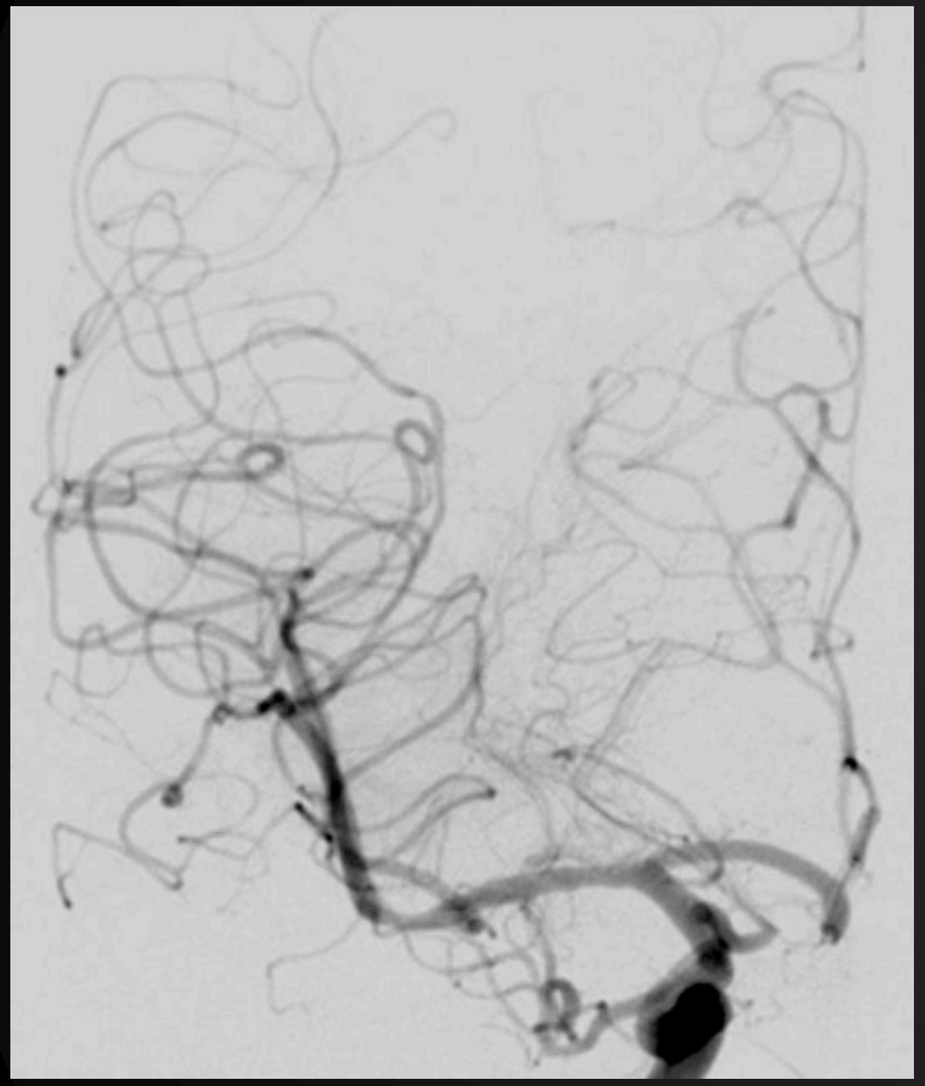
Trombectomia Robotica da Remoto

G.G., ♂ male 60 y.o.

- ✓ 13.01.2015 h 8.00 sudden left hemiparesis
  h 9.40 CT+CTA right M1 occlusion NIHSS 21



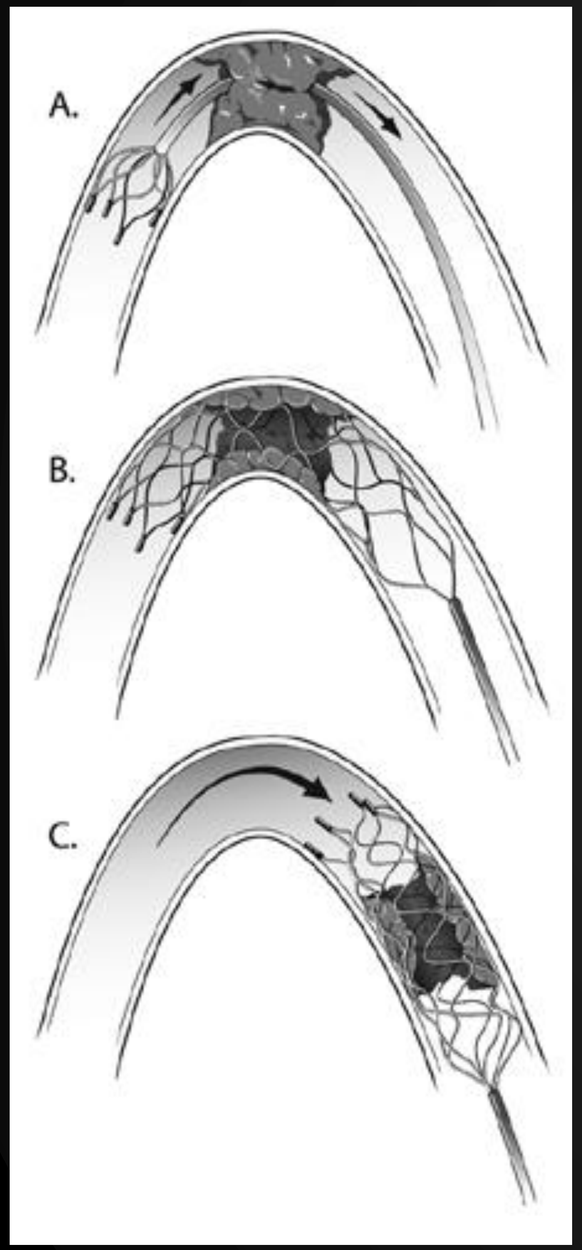


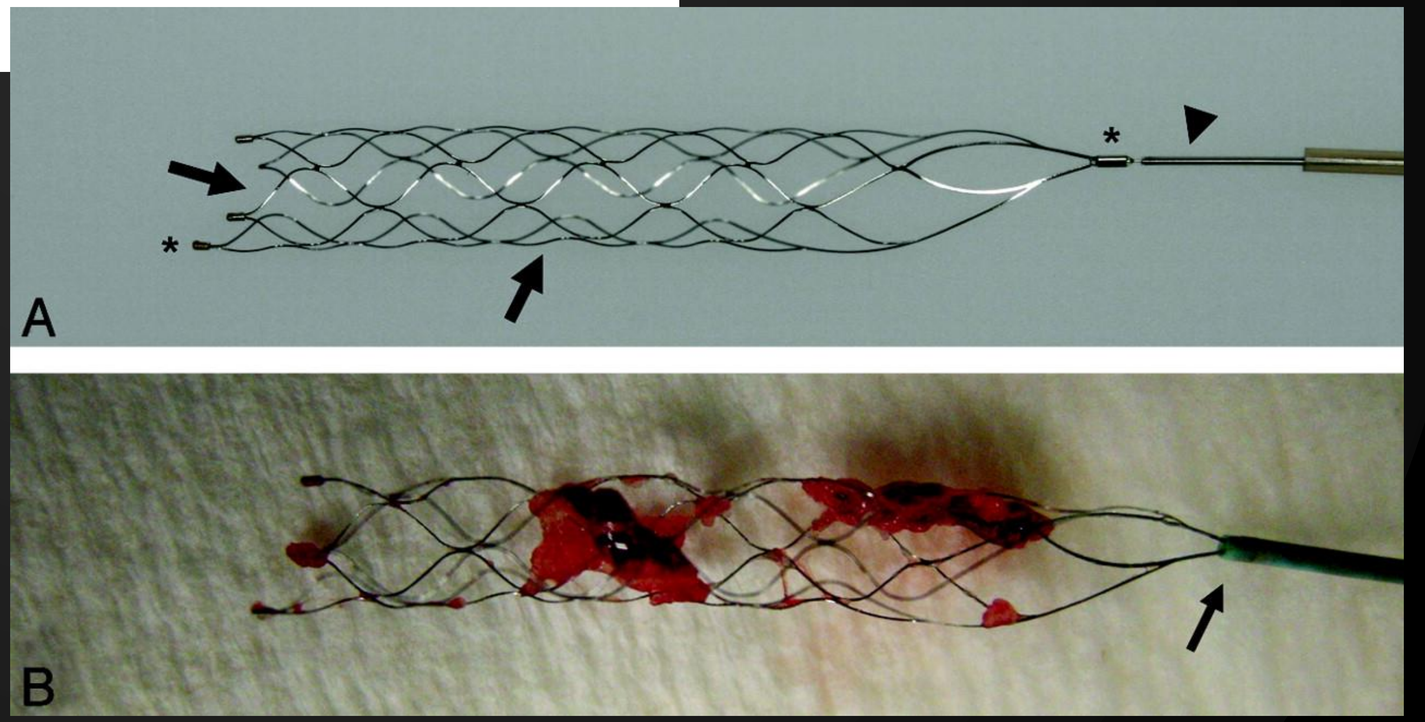


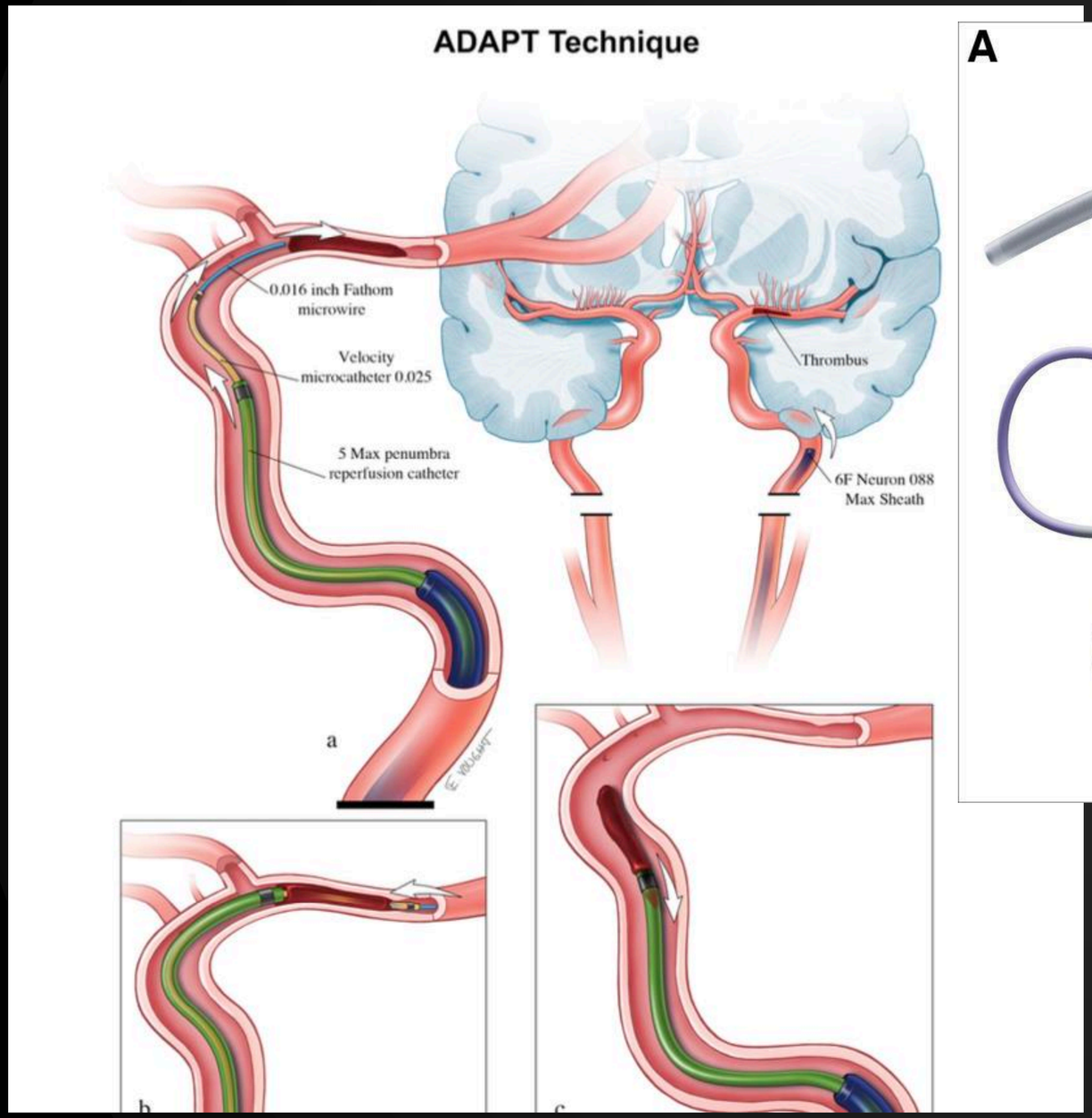
h 10.35 Time from groin puncture to TICI 3: 26’

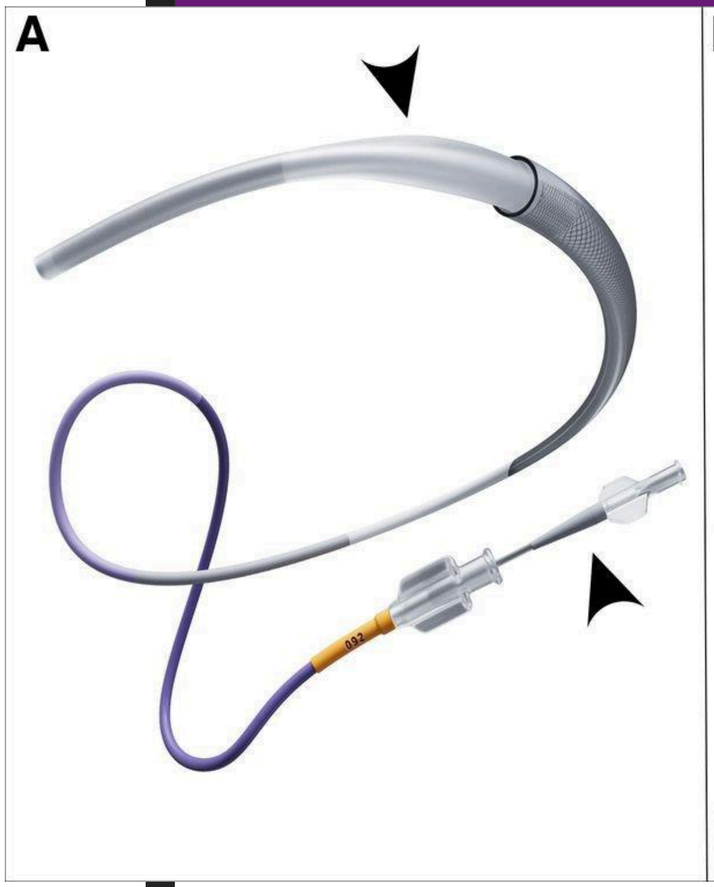
NIHSS at discharge 0

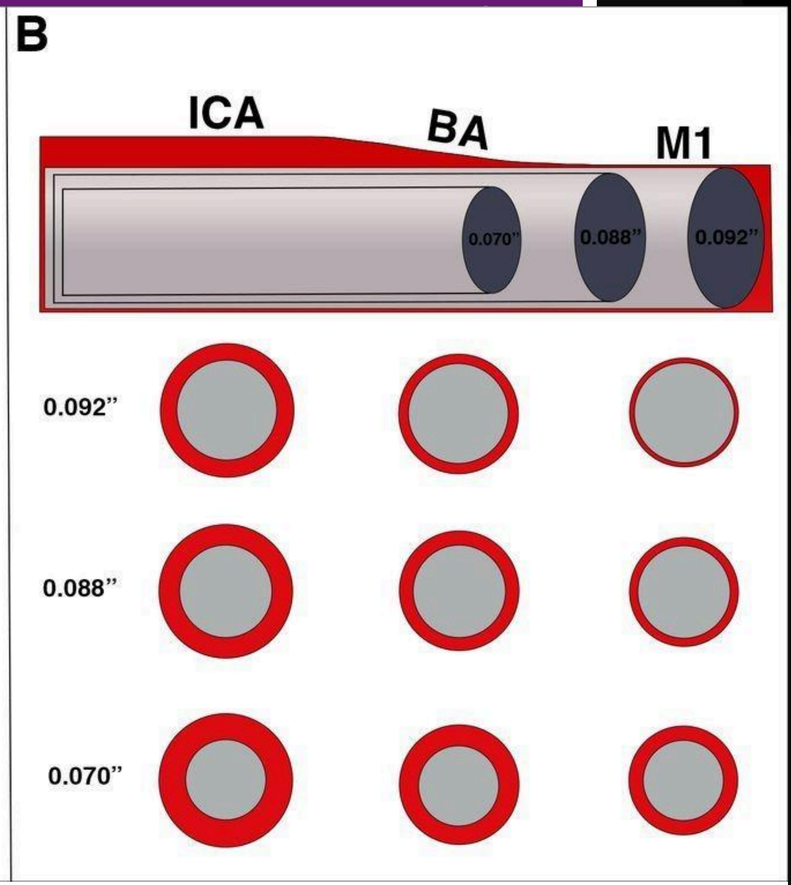
Stent retrievers







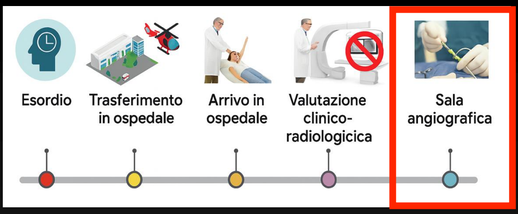




A Direct Aspiration, First Pass Technique (ADAPT) versus Stent Retrievers for Acute Stroke Therapy: An Observational Comparative Study

B. Lapergue, R. Blanc, P. Guedin, J.-P. Decroix, J. Labreuche, C. Preda, B. Bartolini, O. Coskun, H. Redjem, M. Mazighi, F. Bourdain, G. Rodesch, and M. Piotin

Analisi molecolare del trombo in vivo

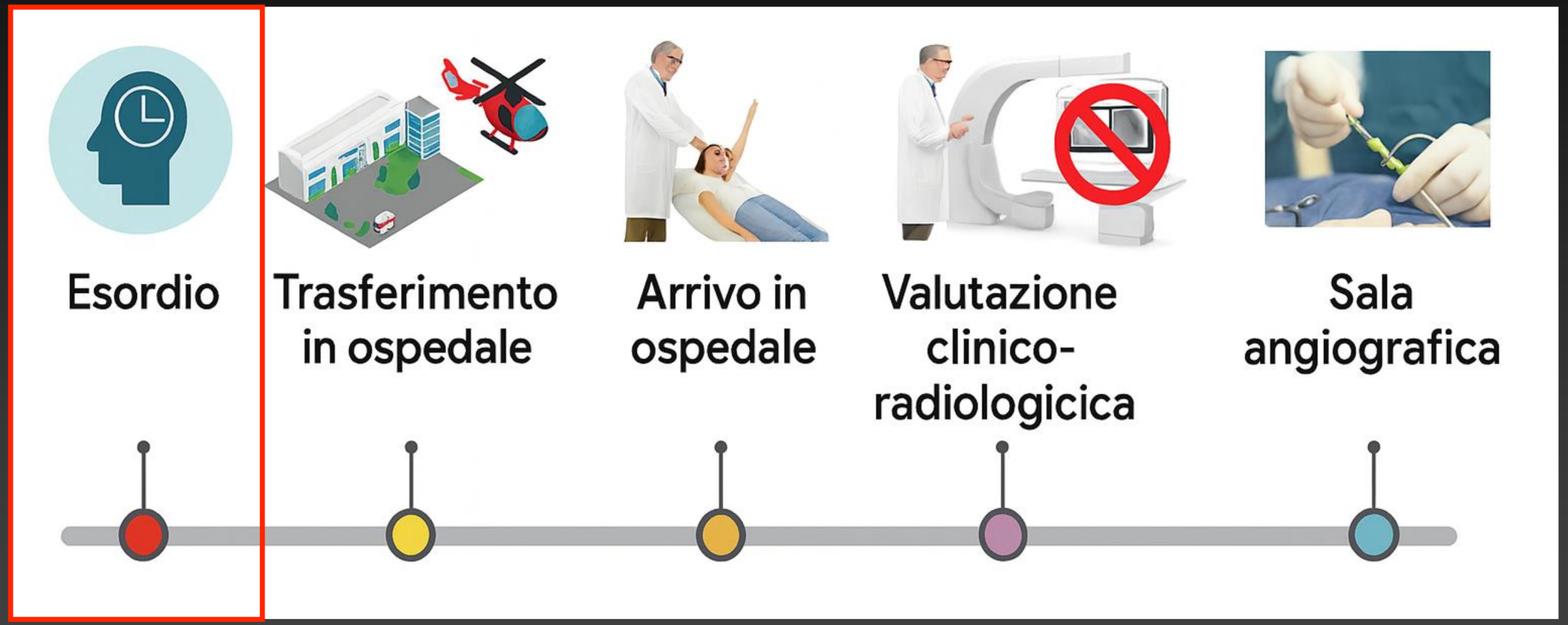


P159 Clotild® a smart guidewire sensing clot characteristics during EVT – results from the CLOT OUT study FREE

Hal Rice [1], Aymeric Rouchaud [2], Nathan Manning [3, 4], Laetitia de Villiers [1], Géraud Forestier [2], Vinicius Do Nascimento [1], Suzana Saleme [2], Julie Lafaurie [5], Joachim Rambeau [5], Franz Bozsak [5], Dennis Cordato [4, 6], Andrew Cheung [3, 4]

Conoscere la composizione del "clot" ottimizza l'utilizzo dei nostri device, incrementando "first pass effect" ed il "door-to-recanilizzation".

Il percorso stroke

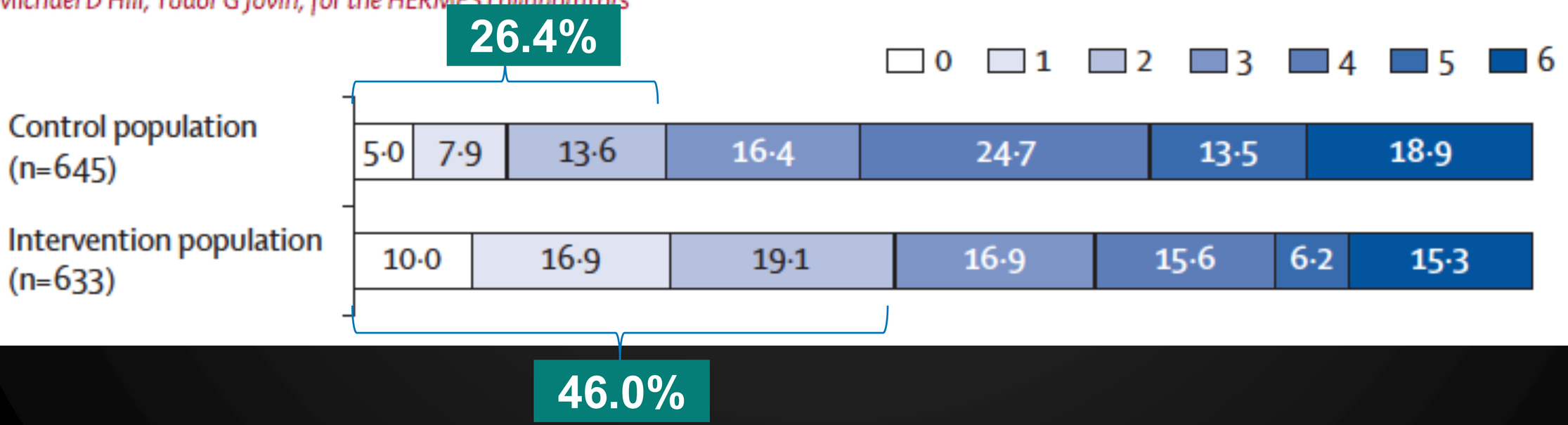


Ogni minuto perso equivale a 1,9 milioni di neuroni: come possiamo sfruttare la tecnologia per ridurre il tempo decisionale?

HERMES Meta-analysis

Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials

Mayank Goyal, Bijoy K Menon, Wim H van Zwam, Diederik W J Dippel, Peter J Mitchell, Andrew M Demchuk, Antoni Dávalos, Charles B L M Majoie, Aad van der Lugt, Maria A de Miquel, Geoffrey A Donnan, Yvo B W E M Roos, Alain Bonafe, Reza Jahan, Hans-Christoph Diener, Lucie A van den Berg, Elad I Levy, Olvert A Berkhemer, Vitor M Pereira, Jeremy Rempel, Mònica Millán, Stephen M Davis, Daniel Roy, John Thornton, Luis San Román, Marc Ribó, Debbie Beumer, Bruce Stouch, Scott Brown, Bruce C V Campbell, Robert J van Oostenbrugge, Jeffrey L Saver, Michael D Hill, Tudor G Jovin, for the HERMES collaborators



Large ischemic stroke

2022

RESCUE-Japan LIMIT

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 7, 2022 VOL. 386 NO. 14

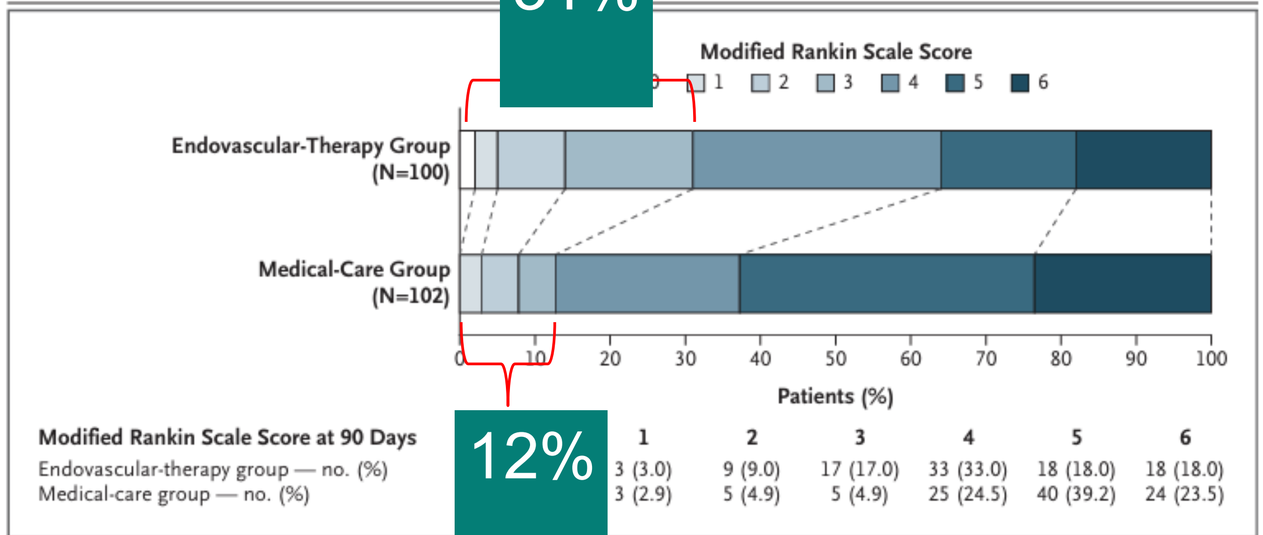
Endovascular Therapy for Acute Stroke with a Large Ischemic Region

S. Yoshimura, N. Sakai, H. Yamagami, K. Uchida, M. Beppu, K. Toyoda, Y. Matsumaru, Y. Matsumoto, K. Kimur
M. Takeuchi, Y. Yazawa, N. Kimura, K. Shigeta, H. Imamura, I. Suzuki, Y. Enomoto, S. Tokunaga, K. Morita,
F. Sakakibara, N. Kinjo, T. Saito, R. Ishikura, M. Inoue, and T. Morimoto

(RR=2.43; 95% confidence interval [CI], 1.35 to 4.37; P = 0.002)

ASPECT: 3-5
Onset: <24h (with negative FLAIR)
NIHSS >6
Large vessel occlusion: ICA or M1

31%



12%

Modified Rankin Scale Score at 90 Days	1	2	3	4	5	6
Endovascular-therapy group — no. (%)	3 (3.0)	9 (9.0)	17 (17.0)	33 (33.0)	18 (18.0)	18 (18.0)
Medical-care group — no. (%)	3 (2.9)	5 (4.9)	5 (4.9)	25 (24.5)	40 (39.2)	24 (23.5)

Figure 2. Distribution of Modified Rankin … at 90 Days.

A modified Rankin scale score of 0 indicates no disability, 1 no clinically significant disability, 2 slight disability, 3 moderate disability but able to walk unassisted, 4 moderately severe disability, 5 severe disability, and 6 death.

Large ischemic stroke

2023 **SELECT 2**

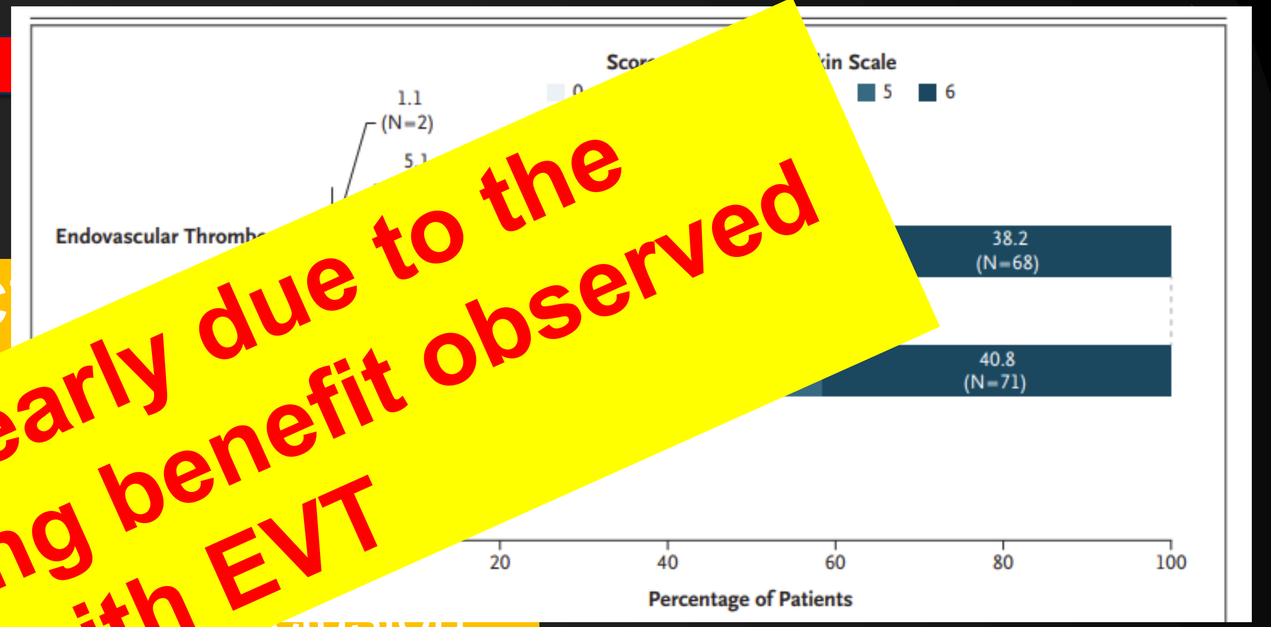
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 6, 2023 VOL. 388 NO. 14

Trial of Endovascular Thrombectomy for Large Ischemic Strokes

A. Sarraj, A.E. Hassan, M.G. Abraham, S. Ortega-Gutierrez, S.E. Kasner, M.S. Hussain, M. Chen, S. Black, C.W. Sitton, L. Churilov, S. Sundararajan, Y.C. Hu, N.A. Herial, P. Jabbour, D. Gibson, A.N. Wallace, J.P. Tsai, R.F. Budzik, W.J. Hicks, O. Kozak, B. Yan, D.J. Cordato, N.W. Manning, M.W. Parsons, A.N. Aghaebrahim, T.Y. Wu, P. Cardona-Portela, N. Pérez de la Ossa, J.D. Schaafsma, S. Warach, C.D. Gandhi, T.J. Kleinig, D. Sahlein, L. Elijovich, W. Tekle, E.A. Samani, M.N. Psychogios, A. Shuaib, D.K. Pujara, F. Shaker, H. Johns, G. Sha, M.H. Rahbar, C. Cai, P. Lavori, S. Hamilton, T. Nguyen, J.T. Fifi, S. Davis, L. M.D. Hill, J.C. Grotta, M. Ribo, B.C. Campbell, and G.W. Albers, fo

ASPEC



Stopped early due to the overwhelming benefit observed with EVT

ANGEL ASPECT

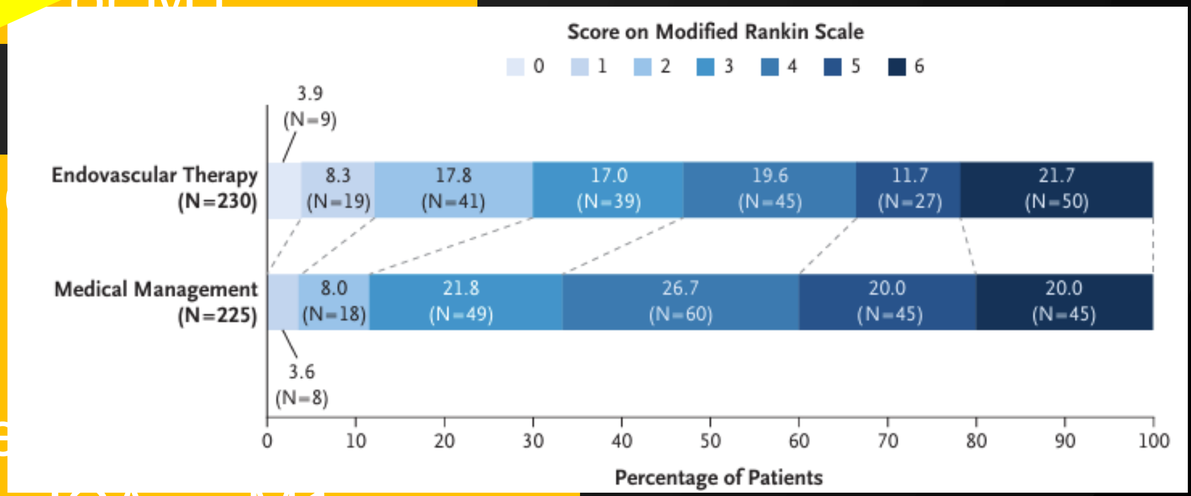
Trial of Endovascular Th te Ischemic Stroke with La farct

X. Huo, G. Ma, X. Tong, X. Zhang, Y. Pan, T.N. Nguyen, G. Yuan, H. Han, W. Chen, M. Wei, Jiangang Zhang, Z. Zhou, X. Yao, G. Wang, W. Song, X. Cai, G. Nan, D. Li, A.Y.-C. Wang, W. Ling, C. Cai, C. Wen, E. Wang, L. Zhang, C. Jiang, Y. Liu, G. Liao, X. Chen, T. Li, S. Liu, J. Li, F. Gao, N. Ma, D. Mo, L. Song, X. Sun, X. Li, Y. Deng, G. Luo, M. Lv, H. He, A. Liu, Jingbo Zhang, S. Mu, Lian Liu, J. Jing, X. Nie, Z. Ding, W. Du, X. Zhao, P. Yang, Liping Liu, Yilong Wang, D.S. Liebeskind, V.M. Pereira, Z. Ren, Yongjun Wang, and Z. Miao, for the ANGEL-ASPECT Investigators*

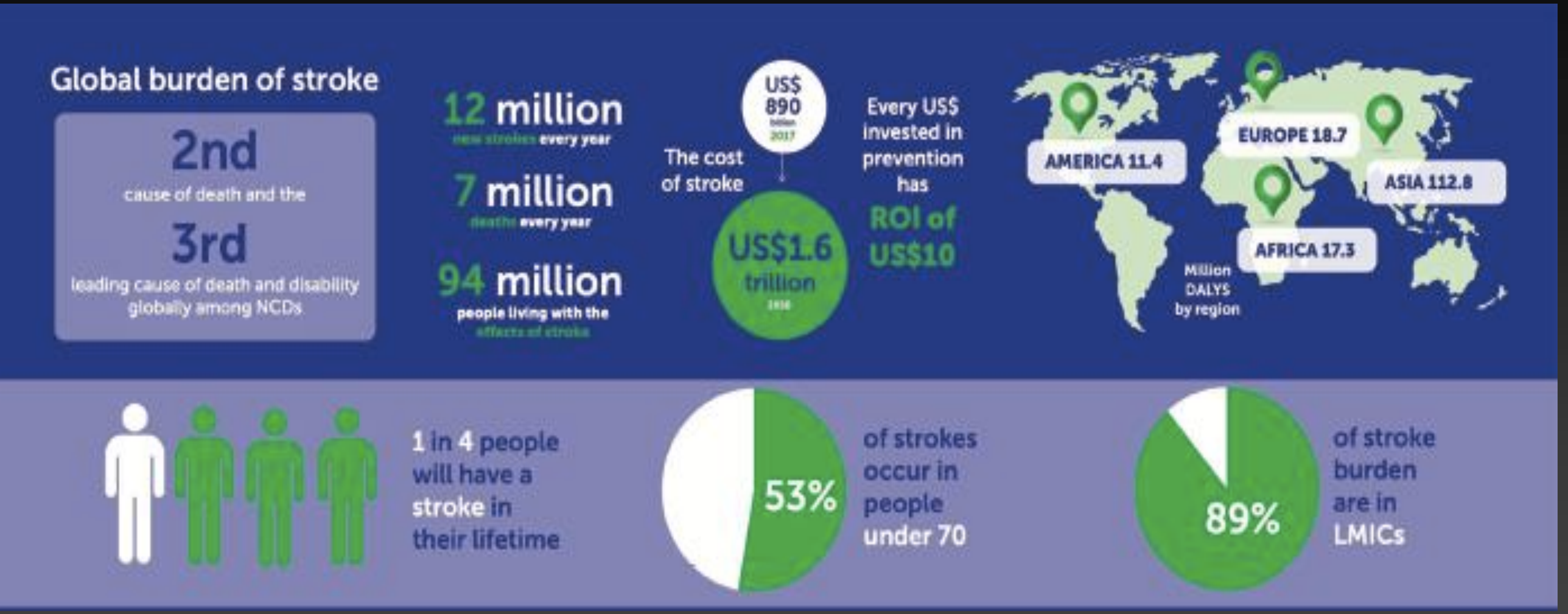
ASPE

Large

ICA or M1



Who should we exclude to MT?



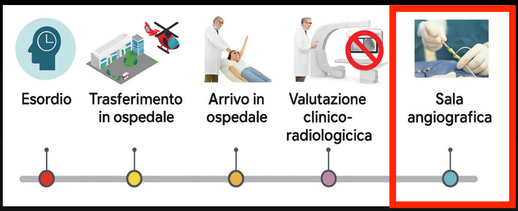
Le proiezioni per l' Europa indicano un aumento dell' incidenza del 26% e un incremento del 44% dei costi sanitari legati alla gestione dell' ictus entro il 2040.


Illustri colleghi non
perdiamo tempo

Sensibilizzazione alla diagnosi precoce e Prevenzione dell'ictus ischemico

Ogni minuto guadagnato in consapevolezza è un neurone salvato in emergenza.

Conclusioni



INNOVAZIONE non è solo tecnologica… INNOVARE significa CONNETTERE tecnologia, persone e conoscenza: solo così il percorso stroke diventa non solo più veloce, ma anche più intelligente e personalizzato.