

A one-to-one telestroke network

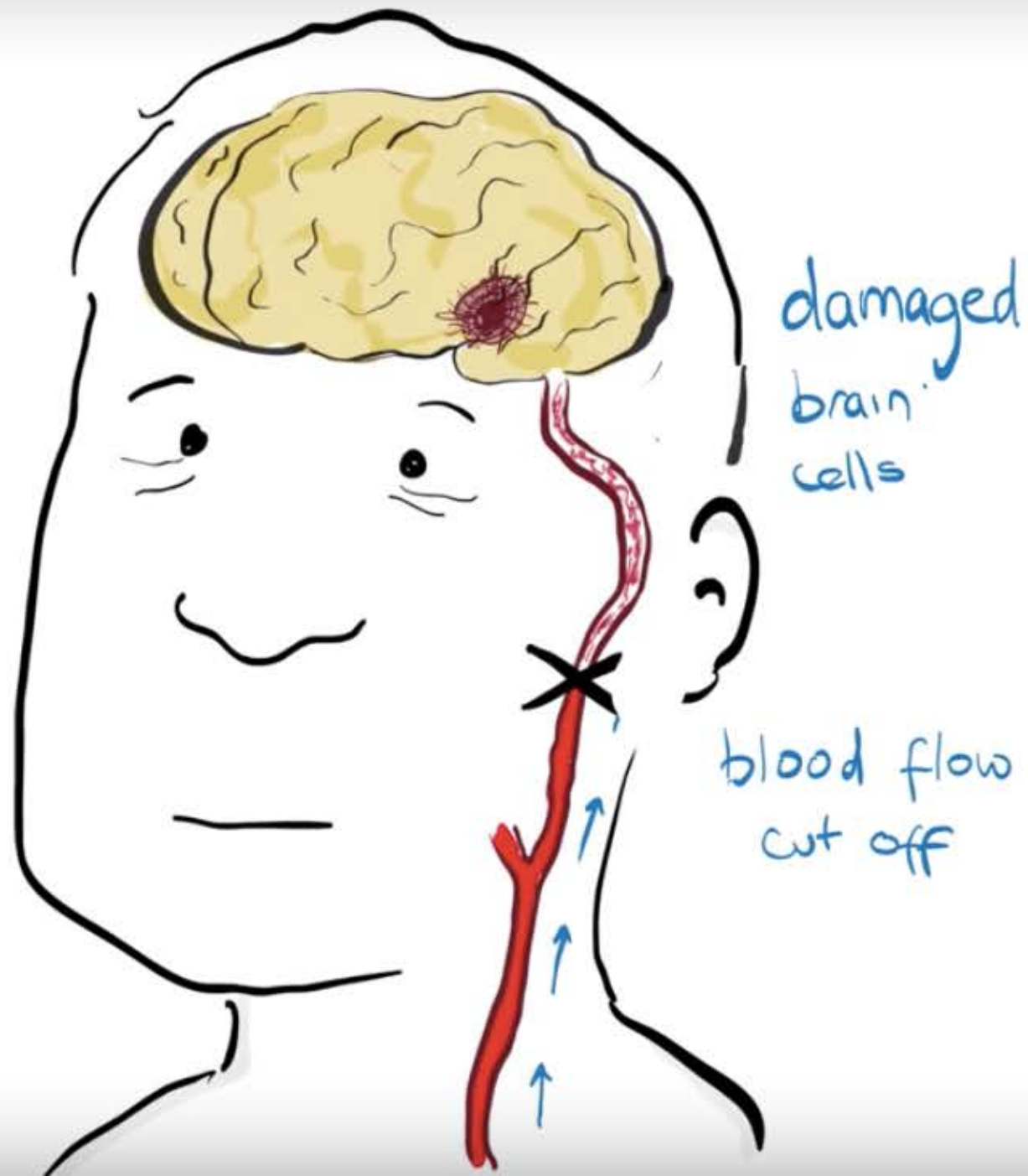
The first Italian study of a web-based telemedicine system for thrombolysis delivery and patient monitoring



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What is a stroke?

//



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**What are the
symptoms of a stroke?**

//

SPEECH DIFFICULTIES



VISION LOSS



**FACIAL
PARALYSIS**



BALANCE



HEADACHE



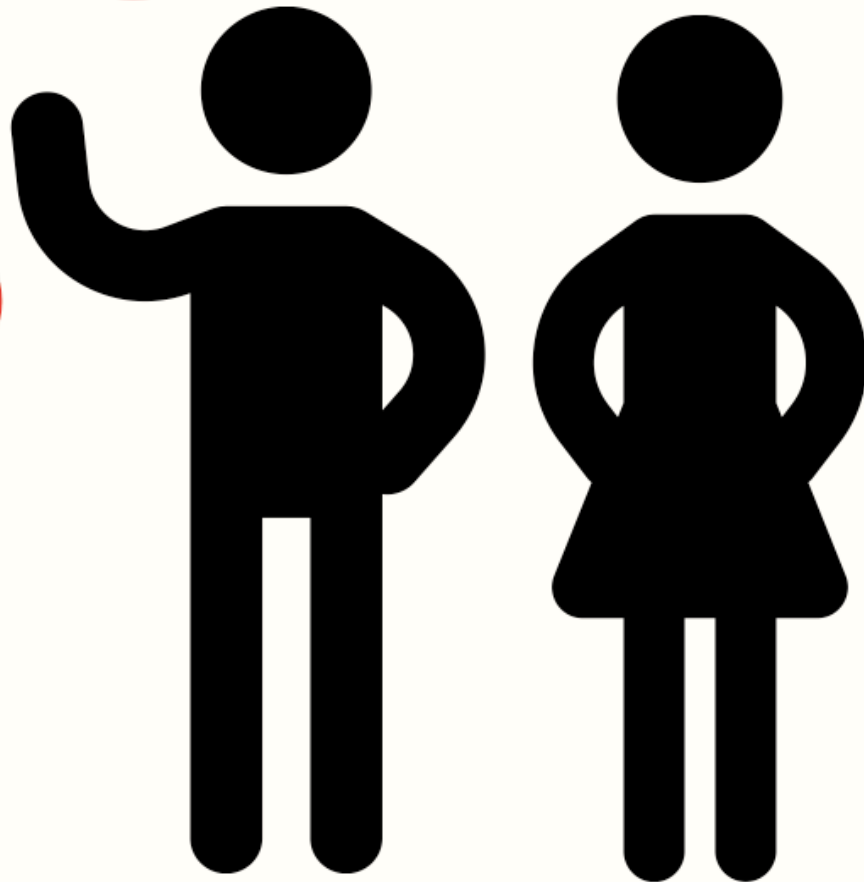
WEAKNESS



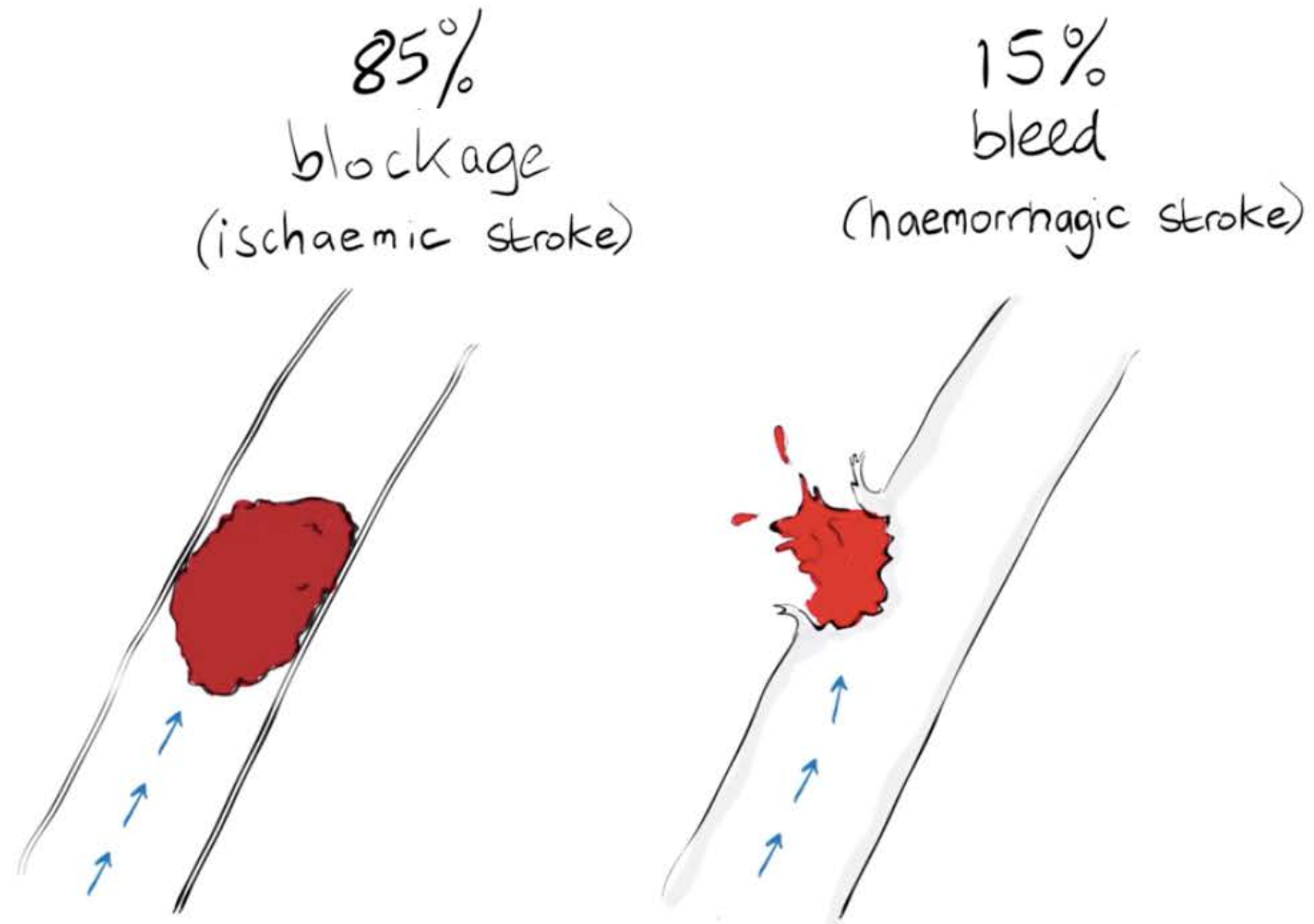
CONFUSION



**DIFFICULTY
SWALLOWING**

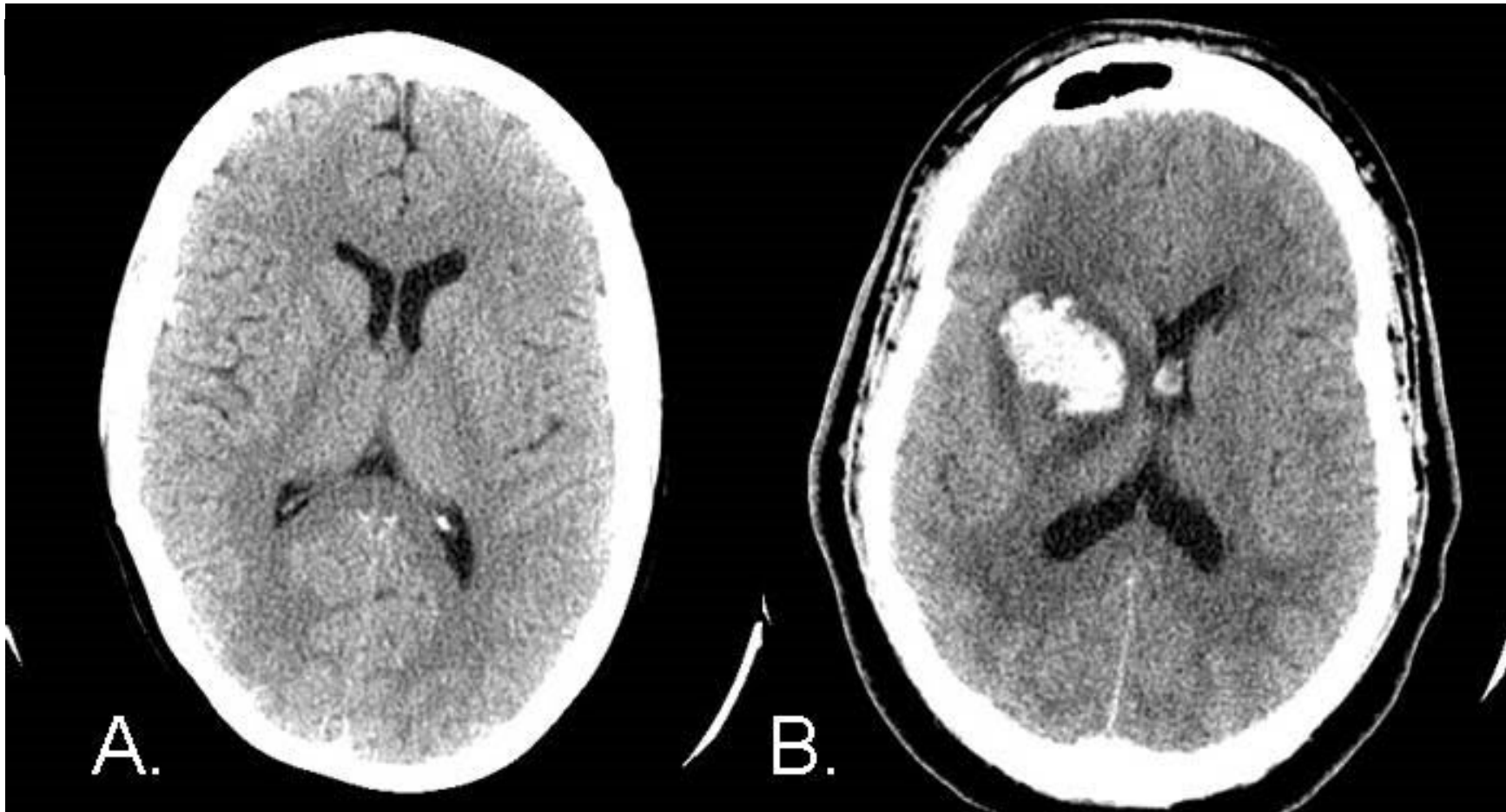


Two types of strokes



Treatment of stroke

Really important to know which type of stroke a patient has:

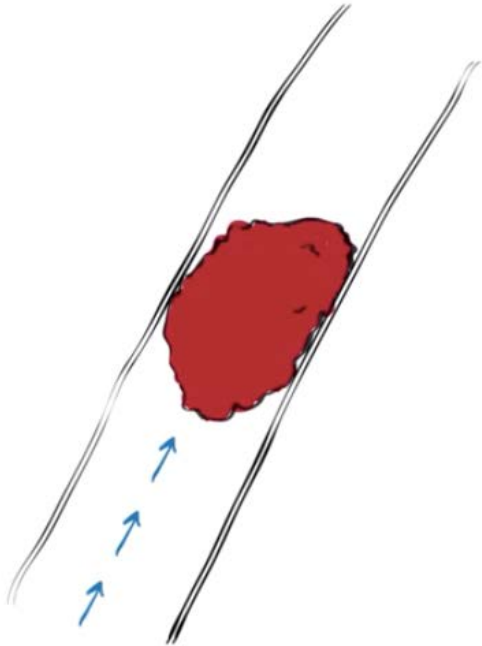


Fellow student question:

What is thrombolytic therapy?

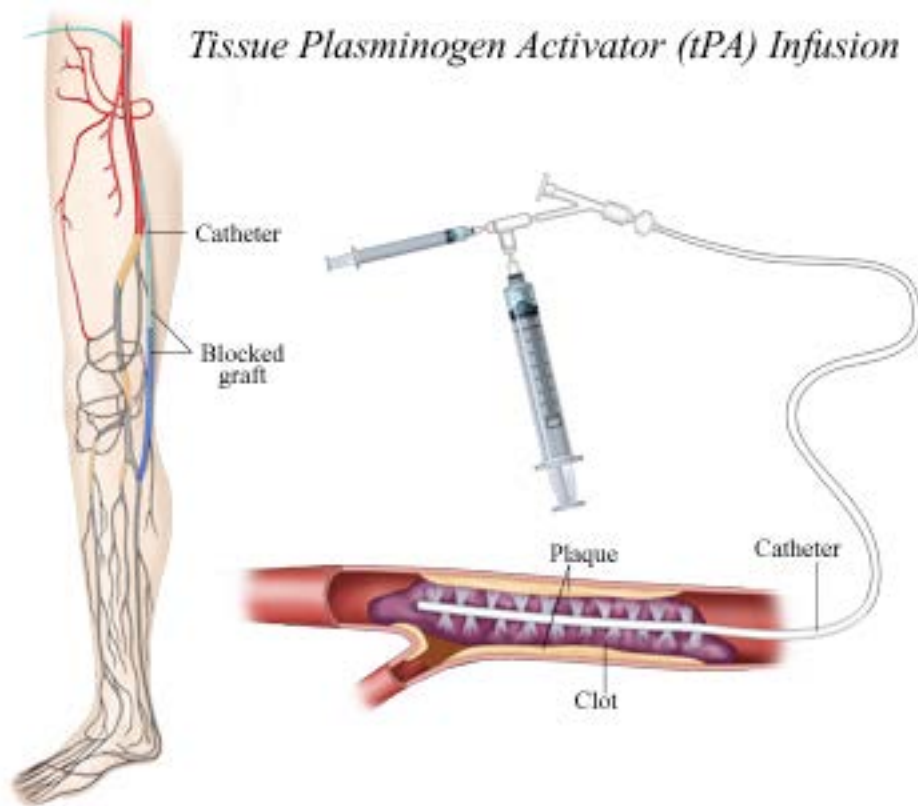
Treatment of stroke: tPA

85%
blockage
(ischaemic stroke)



- Thrombolytic therapy
 - tPA = Tissue Plasminogen Activator
 - Clot buster
-
- FAST: treatment within 3 hours

Treatment of stroke: tPA



Risks:

- haemorrhagic stroke
- stomach bleeding
- intestinal bleeding
- bleeding in the urine
- bleeding of healing wounds

Time is of the essence



Veneto Region Italy

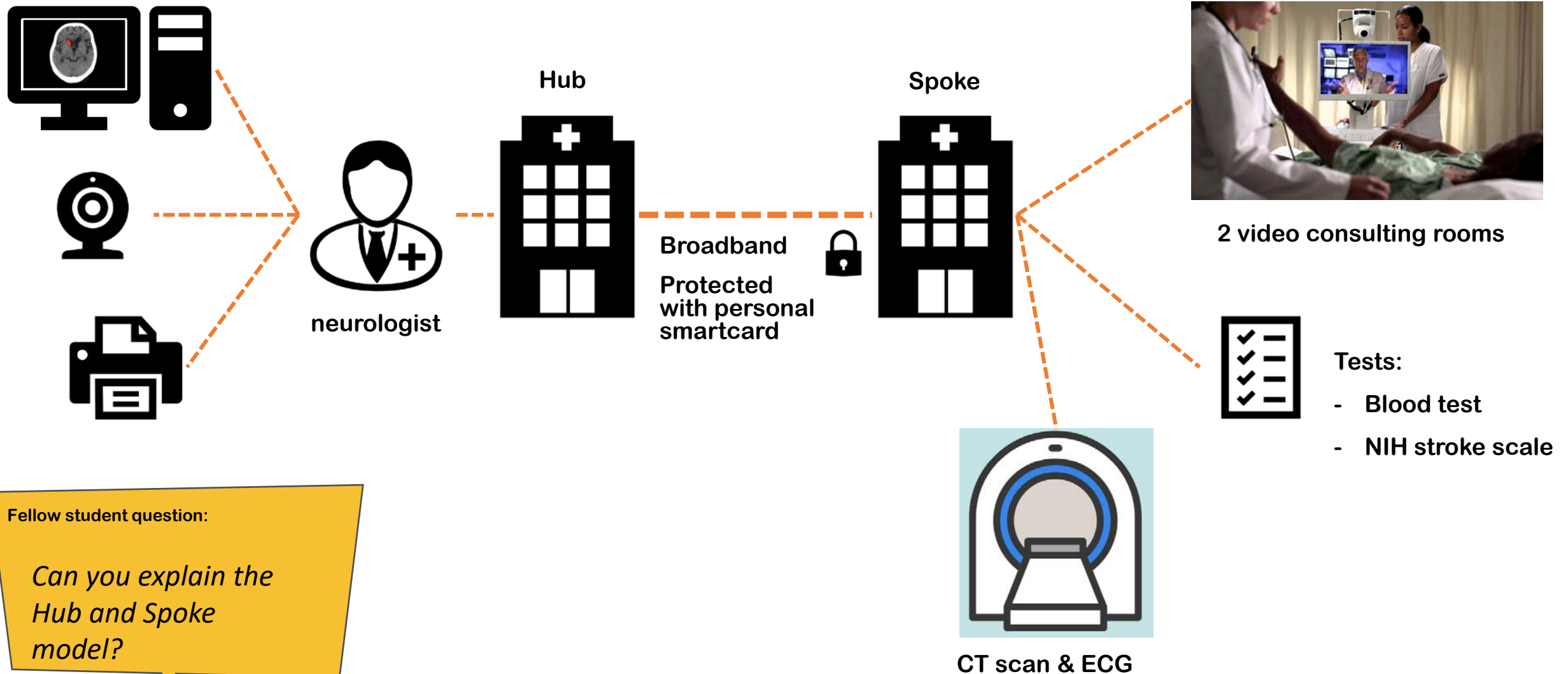
Treviso Hospital (Hub)

- Stroke unit with stroke specialists
- Neurologic ward (24/7)

Conegliano hospital (Spoke)

- No neurology department
- Neurology service from 8 am to 5 pm
- Unable to transfer acute stroke patients to Treviso

Implementation of Telestroke system



Implementation of Telestroke system



Recommendations:

- Patient is eligible for thrombolytic treatment and tPA must be administered
- Patient is eligible for thrombolytic treatment but must be transferred to the Hub center (because of tPA protocol violation)
- Patient is not eligible for thrombolytic treatment
- Other



2 video consulting rooms



Tests:

- Blood test
- NIH stroke scale



CT scan & ECG

Results

Table 1 Number of thrombolysis per year in the Hub center and in the telestroke program

Year	Thrombolysis				Total	Total
	Stroke unit		Telestroke		N	%
	N	%	N	%		
2011	24	22.7	5	20	29	22.1
2012	40	37.7	10	40	50	38.2
2013	42	39.6	10	40	52	39.7
Total	106	100	25	100	131	100

Percentage of patients	Change in NIHSS (after 24h)	Percentage of patients	Change in mRS (after 3 months)
48%	-4	42.8%	<2
28%	0	28.5%	3-4
8%	+4	10.7%	6
8%	Symptomatic haemorrhage	7.1%	No data

Table 2 Characteristics of patients and times of treatment

	Age		Baseline NIHSS		Onset to door (min), median	Door to scan (min), median	Door to needle (min), median
	Mean (±SD)	Median	Mean (±SD)	Median			
Stroke unit	67.8 (±14.4)	71.5	11.6 (±6.1)	11	55 (I quartile 39, III quartile 74)	23 (I quartile 16, III quartile 38)	95 (I quartile 82, III quartile 125)
Telestroke	68.5 (±10.7)	72	10.4 (±5.0)	9	57 (I quartile 32, III quartile 72)	24 (I quartile 14, III quartile 38)	73 (I quartile 98, III quartile 121)

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Fellow student question:

What is the NIH stroke scale score and how is it computed?

[NIH Stroke Scale](#)

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mRS (modified Rankin Scale)

- 0 - No symptoms.
- 1 - No significant disability. Able to carry out all usual activities, despite some symptoms.
- 2 - Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.
- 3 - Moderate disability. Requires some help, but able to walk unassisted.
- 4 - Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.
- 5 - Severe disability. Requires constant nursing care and attention, bedridden, incontinent.
- 6 - Dead.

Table 2 Characteristics of patients

	Age		Median	Mean (±SD)	N	Median	Mean (±SD)	N	Median	Mean (±SD)	N	Median	Mean (±SD)	N	Door to needle (min), median
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Fellow student question:

Could you explain more precisely what are: onset to door, door to scan and door to needle times?

Results

Fellow student question:

Why do the numbers of patients treated thanks to the Telestroke system in Table 1 seem very artificial (5,10,10 for years 2011-2013)?

Fellow student question:

Since T test was used, do you think the significant effect was due to the sample size? Dont you think effect size should have been measured to validate the results?

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Results

Fellow student question:

Why the OTT and DTN pathway times were longer than the TEMPiS and REACH studies?

Table 4 Comparison of published representative European telestroke programs: telestroke models and telethrombolysis data

	TEMPiS [1]	TEMPiS [2]	EoE telestroke	Meuse (east france)	Finnish telestroke	Barcelona Spain	Madrid Spain	Italy
Number of thrombolysis	106	115	74	21	61	46	18	25
Mean age	68	69.7	69	72	70	nk	68	68.5
Median NIHSS	12	12	10	Mean 16	10	nk	6.5	9
Onset-to-treatment time (min)	141	134	170.1	169	130	nk	155	151.4
Door-to-needle time (min)	76	68	94.9	69	24	53.4	66	96.8
% hemorrhage	8.5	7.8 %	7.3	14	6.7 %	8,69 %	0	8
mRankin 3 months <2 (%)	nk	nk	nk	29 %	29.4 %	53.65 %	55.6 %	42.8 %
Period	February 2003–April 2004	2004	2010–2011	October 2010–February 2012	2007–2009	2007–2010	2010–2013	2011–2013

Other telestroke projects

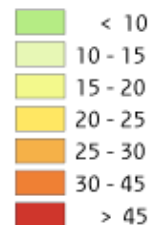
- REACH project: 8 rural community hospitals in Georgia (US)
- TEMPiS project in Bavaria (Germany): 2 hubs (stroke centers in Munich-Harlaching and in Regensburg) and 12 spokes (local hospitals in eastern Bavaria)
- Telemedicine project in the district of Meuse (a depopulated rural area in the east of France) with 1 hub (stroke unit hospital Nancy) and 1 spoke (Bar le Duc community hospital)
- Telemedicine project in North Carolina (US) with 1 hub (Medical University of South Carolina) and 12 spokes (community hospitals in South Carolina)
- UPMC telestroke network in western Pennsylvania with 1 hub (University of Pittsburgh Medical Center) and 12 spokes (community hospitals in western Pennsylvania)
- Telemedicine project in Spain with 1 hub and 1 spoke
- STRoKE DOC trial in California (US) with 1 hub and 4 spokes
- The East of England telestroke project without hub/spoke but with 7 collaborating rural hospitals (Ipswich Hospital, James Paget University Hospital, Lister Hospital, Peterborough Hospital, Queen Elizabeth Hospital, Watford General Hospital, and West Suffolk Hospital)
- HUCH Telemedicine in Finland with 1 hub (Helsinki University Central Hospital) and 5 spokes (community hospitals)
- TESS project in south Germany with 1 hub (stroke unit of Günzburg) and 7 spokes (rural hospitals)
- STENO project in Germany: stroke network of 20 hospitals (one of the largest thus far)
- Madrid Telestroke project with 1 hub and 1 spoke
- NHS Scotland telestroke; 5 networks of multiple hospitals

Telestroke in the Netherlands

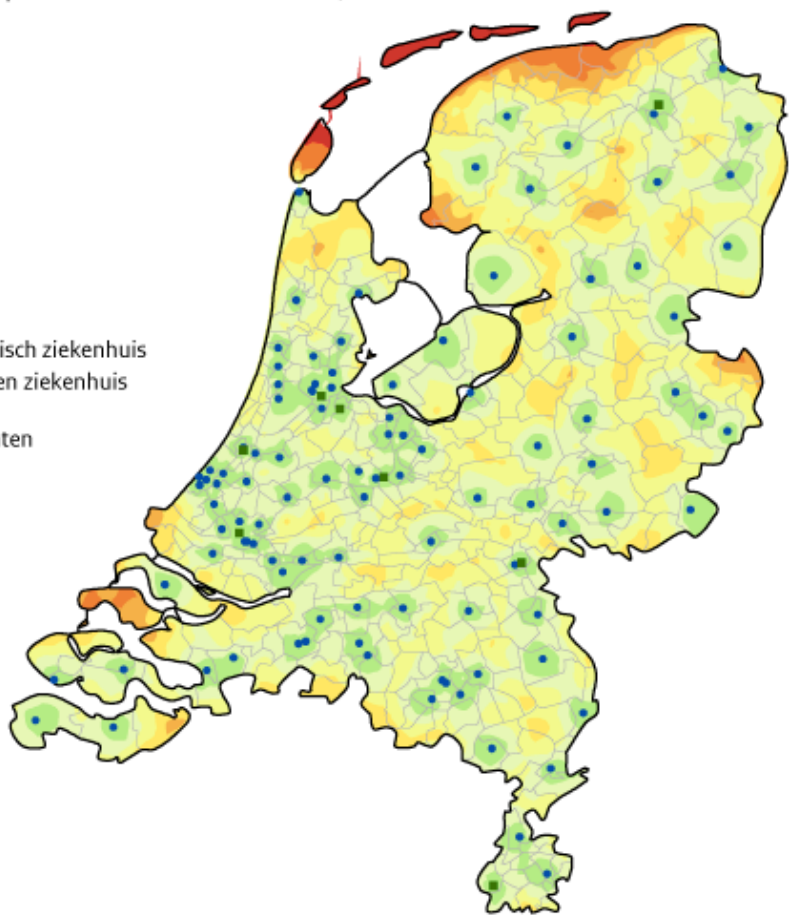
Reistijd naar dichtstbijzijnde ziekenhuis 2018

exclusief buitenpoliklinieken en kinderziekenhuizen, met de auto

Minuten



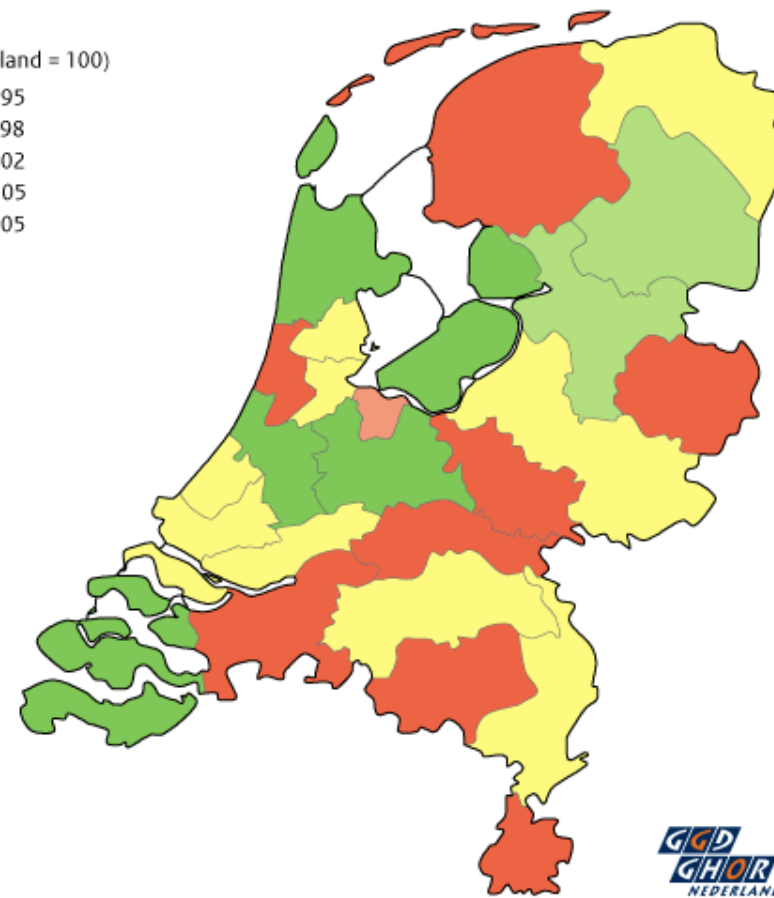
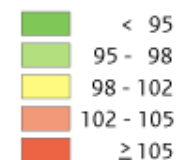
■ academisch ziekenhuis
● algemeen ziekenhuis
— gemeenten

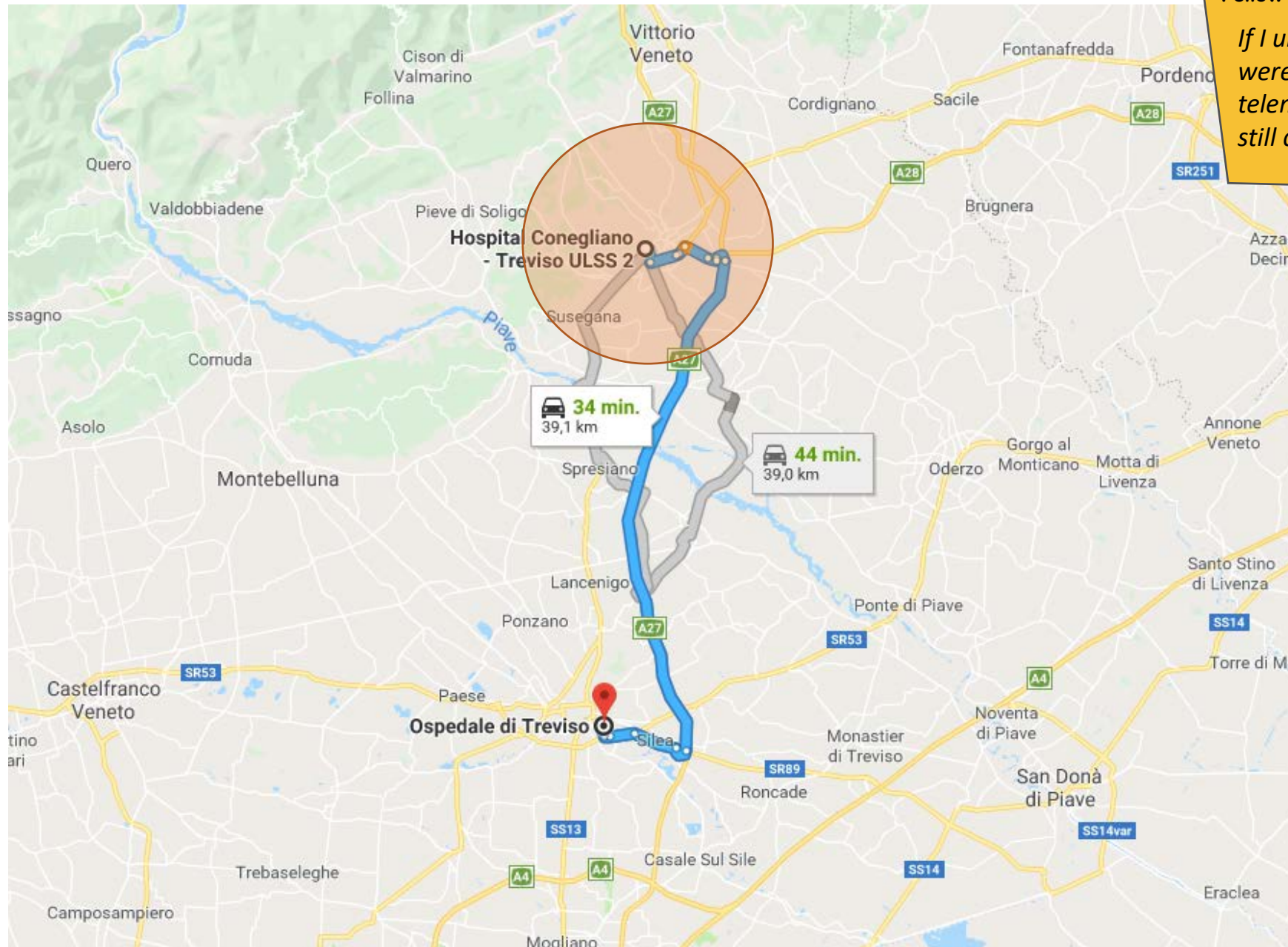


Sterfte aan beroerte 2013-2016

Per GGD-regio, gecorrigeerd voor leeftijd en geslacht

Index (Nederland = 100)





Fellow student question:

If I understand correctly, patients were not helped quicker thanks to telemedicine. Why do the authors still conclude this was a success?

Question to you

Do you think that the usage of telethrombolysis poses a greater risk to the patient versus the patients that receive thrombolysis at the hub center?

Question to you

Could other therapies and/or illnesses be implemented into this system?



Questions?

Implementation of Telestroke system



- **HEALTH OPTIMUM (HEALTHcare delivery OPTIMisation throUgh teleMedicine)**
- **EU programme eTEN (deployment of trans-European e-services in the public interest)**
- **EU funding of €67 million for Veneto region**

