Door to groin time in patients with acute ischemic stroke presenting during on- vs off-hours, results from the MR CLEAN Registry

Wouter H Hinsenveld (MD)¹, Inger R de Ridder (MD, PhD)¹, Robert J van Oostenbrugge (MD, PhD)¹, Jan A Vos (MD, PhD)², Geert Lycklama a Nijeholt (MD, PhD)³, Jelis Boiten (MD, PhD)³, Wouter Schonewille (MD, PhD)²

1: Maastricht University Medical Center, Maastricht, The Netherlands; 2: Sint Antonius Hospital, Nieuwegein, The Netherlands; 3: Haaglanden Medical Center, The Hague, The Netherlands.

Background and aim

A large proportion of patients with acute ischemic stroke receiving endovascular treatment for large vessel occlusion (LVO) present during evenings, nights, weekends or holidays.

The aim of this study is to compare workflow times and functional outcome between patients presenting during on- and off-hours.

Methods

We analyzed data from the MR CLEAN Registry, a prospective, multicenter, observational study in the Netherlands that included patients with anterior circulation LVO treated with endovascular therapy (EVT) between March 2014 and June 2016.

Off-hours were defined as time of arrival at the intervention center (IC) or primary stroke center (PC) between 17:00 and 08:00, on weekends (Friday 17:00 to Monday 08:00) or Dutch National Holidays.

Workflow outcomes were corrected with linear regression for age, IVT, NIHSS, local anesthesia only and repeated imaging. Clinical and safety outcomes were corrected with logistic regression for age, IVT, NIHSS, collaterals, preMRS and onset to groin puncture time

Results

A total of 1488 patients were included for analysis. Of these, 935 patients (62.8%) presented during off-hours. More patients were transferred from primary stroke centers (PC) to intervention centers (IC) during off-hours (48.3% vs 57.9%, p <0.001).

Door to groin time was significantly longer during off-hours. For direct referrals, the time interval after imaging was responsible for most of the delay. Transferred patients had most of their delay in the time interval before the IC.

Functional outcome was not significantly different between on- and off-hour presentation. There was no difference in complication rates.

Baseline variables	On-hours N=553	Off-hours N=935	P
Age	71.0 (60.0-80.0)	70.0 (59.0-79.0)	0.16
Men	280 (50.6%)	514 (55.0%)	0.10
NIHSS	15.0 (11.0-20.0)	16.0 (12.0-20.0)	0.70
Pre-mRS ≥3	73 (13.5%)	98 (10.7%)	0.11
IVT performed	439 (79.7%)	722 (77.3%)	0.29
Transfers	267 (48.3%)	541 (57.9%)	<0.001
LA only	311 (59.7%)	499 (59.3%)	0.90
Last seen well	138 (25.0%)	233 (24.9%)	0.99

Continuous and categorical variables are displayed using median and interquartile range. Pre-mRS: modified Rankin Scale at baseline. LA only: Local Anesthesia only, no general anesthesia or conscious sedation performed.

Regression analysis	Delay in minutes (95% CI)	
First door to groin	14.76 (9.09 – 20.43)	
Door to needle	3.39 (0.48 – 6.29)	
Stratification	Direct Referrals Delay in minutes (95% CI)	Transfers Delay in minutes (95% CI)
First door to groin*	16.85 (9.87 – 23.84)	12.49 (3.85 – 21.12)
Door to needle	2.84 (-0.73 – 6.41)	3.66 (-0.74 – 8.07)
PC door to IC door	N/A	9.19 (1.86 – 16.51)
IC door to groin	N/A	3.17 (-1.95 – 8.29)

Displayed are beta coefficients adjusted for confounders using imputed data which indicate the delay between on-hour and off-hour presentation in minutes. PC: Primary stroke center; IC: Intervention Center. *: p = 0.475 for the interaction of transfer status on off-hour delay

Modified Rankin Scale at 90 days using unimputed data (n=1363). The adjusted common Odds Ratio shows the odds of a positive shift on the mRS scale of 1 point when patients present during off-hours.

Conclusion

Off-hour presentation for patients presenting with acute large vessel occlusion stroke seems to be associated with a door to groin delay of 15 minutes.

This delay may be more pronounced in direct referrals when compared to transferred patients. This delay doesn't seem to lead to worse functional outcome or higher complication rates.