
# STROKE TREATMENT

# ED CULTURE CHANGE: *OUR EXPERIENCE*

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19th Annual Stroke Symposium in Kansas City

# Disclaimer

- **Board certified in emergency medicine**

- **I  have no financial disclosures**
- **I have no conflict of interest**
- **I will not discuss any unlabeled or investigational uses of products**

# Objectives

- To look at stroke care at our community hospital
  - review a recent case and treatment
- To highlight a coordinated-care approach in community stroke care and share our experience

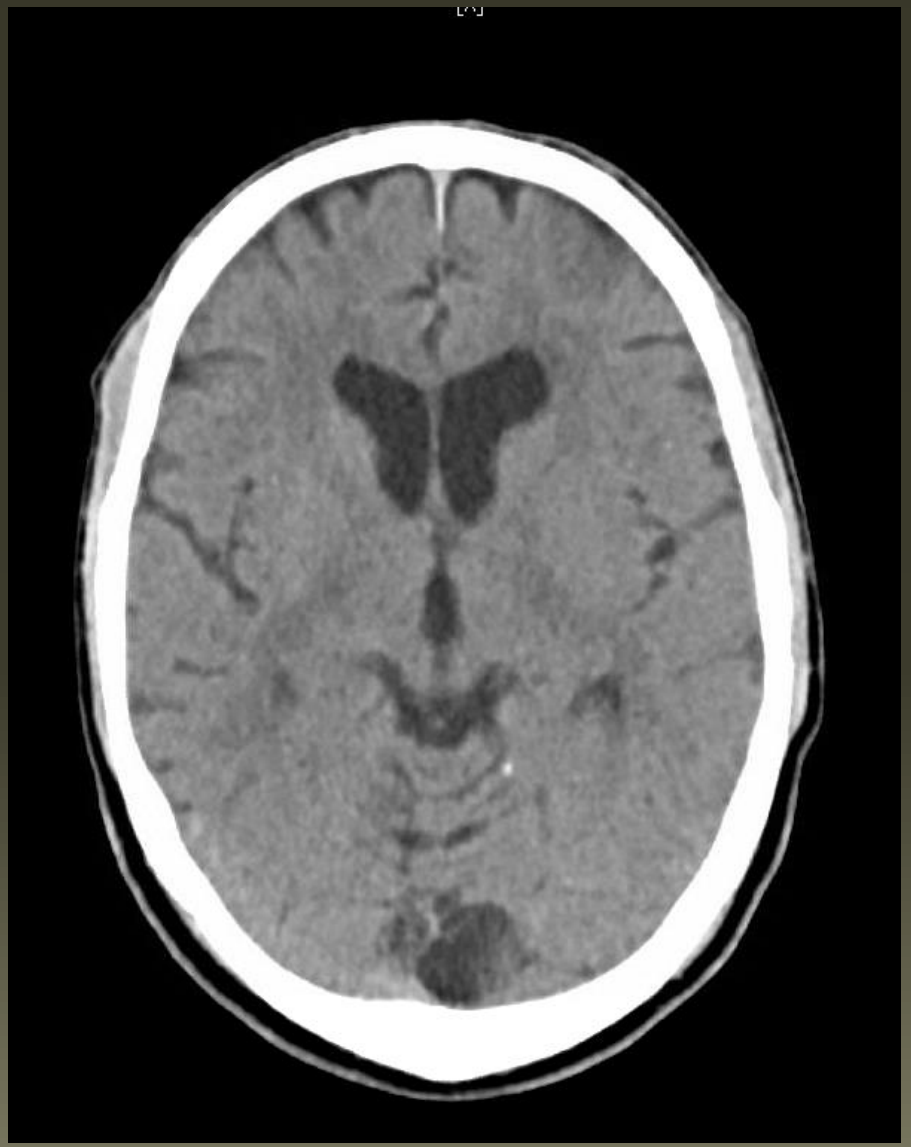
# Patient's Initial presentation

- Patient's pre-hospital stroke alert by EMS
- Patient arrives via EMS & taken to CT
- Code Stroke called
- Non-contrast head CT done
- Patient taken to ED critical room
- Chief Complaint  "wife reports pt. was in bathroom when she heard a "crash and then another crash" at 0847 -- pt. having slurred speech and right sided weakness"

# Physical Exam

- **General: Alert**, mild distress.
- **Eye:** Pupils are equal, round and reactive to light, extraocular movements are intact.
- **Ears, nose, mouth and throat:** Oral mucosa moist, no pharyngeal erythema or exudate.
- **Cardio/Resp:** Regular rate and rhythm, No murmur, Normal peripheral perfusion. Lungs are clear to auscultation, respirations are non-labored, breath sounds are equal, Symmetrical chest wall expansion.
- Musculoskeletal: **No tenderness, no swelling, R sided weakness in arm and leg (unable to hold R arm off of bed), Not normal ROM,**
- **Neurological: profound R sided weakness, aphasia, Cognitive function: not normal thought processes, Speech: Slurred, Gait: not tested.**
- **NIHSS 20**
- Psychiatric: Cooperative, appropriate mood & affect.

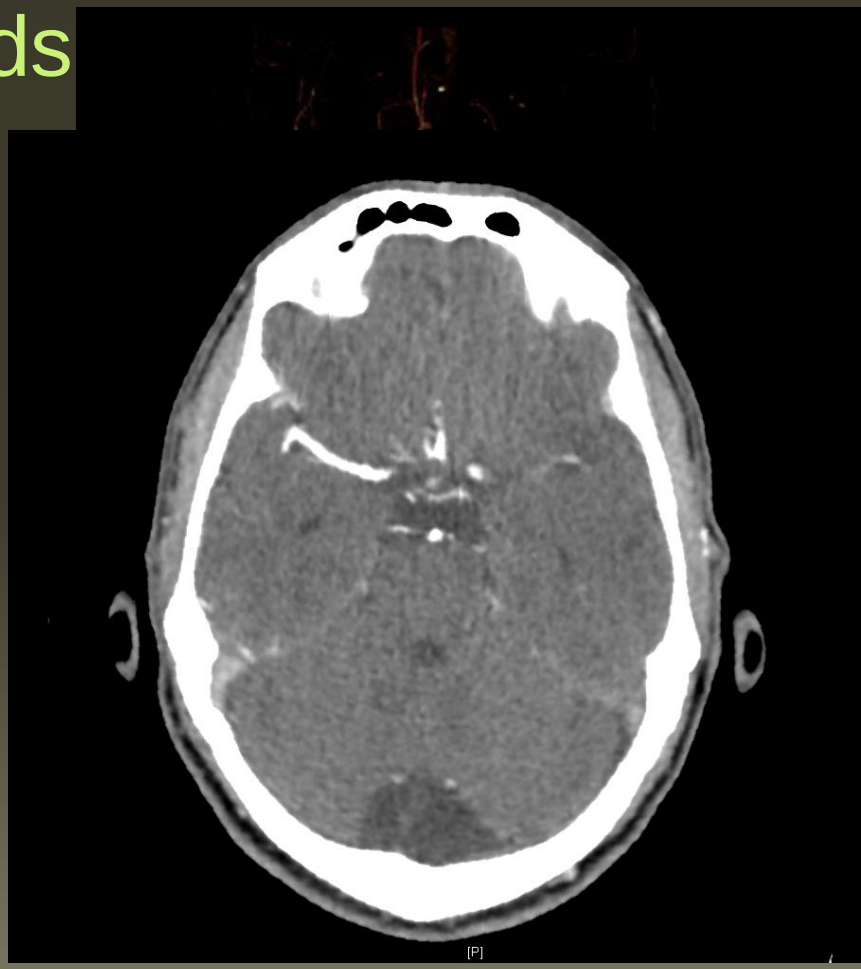
# CT Head



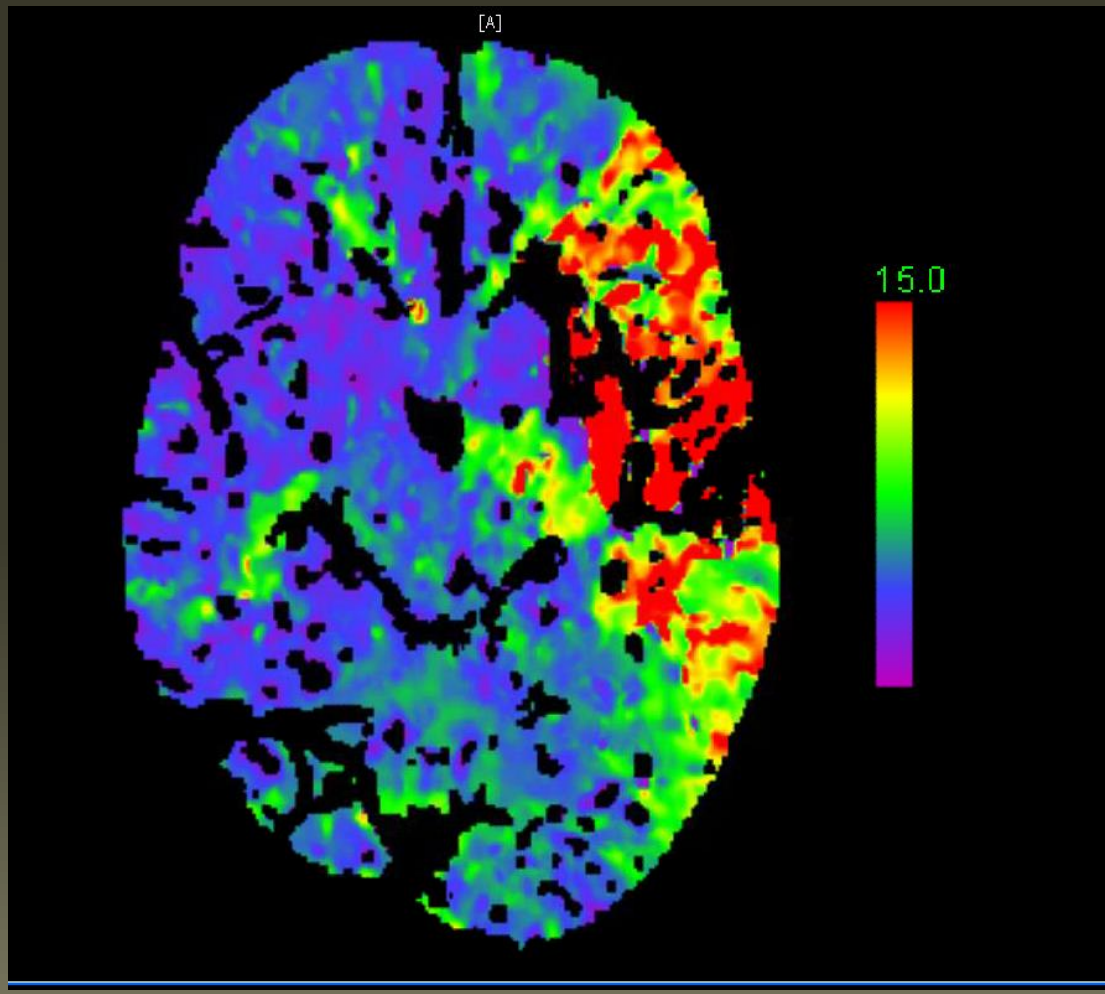
# Medical Decision Making

- **Differential Diagnosis:** Non-hemorrhagic or hemorrhagic CVA, seizure, syncope, hypoglycemia, etc.
- **Last Known Well:** 840
- **TPA ordered** Yes (forced field)
- **Head CT:** No acute process, by Radiologist as of 918
- ED provider note @ 920: TPA is a go
- ED provider note @ 930: Getting TPA bolus

# CTA Head and carotids



# CT perfusion



# Medical Decision Making

- EDP note @ 1025 - occluded left M1 segment, L ICA reconstitution; will d/w KU when have report
- EDP @ 1030: Spoke with Dr. @ KU stroke who requested CT perfusion, thinks patient may be a candidate for endovascular intervention. We will obtain and find out if helicopter is available
- Images have been put on the cloud.
- ED note @10:33: Helicopter on standby
- ED note @ 1045: Accepted, helicopter

# Our initial goal

- To improve the system stroke care at our community hospital
  - Stroke patients should receive the best available care regardless of their geographic location
- Recognized it requires internal cooperation, interdepartmental coordination and communication between facilities -> comprehensive stroke centers (them) and primary stroke center (us)

# Why was this patient outcome possible?

- Because of a **coordinated approach to care**

- Required **changing the culture**
  - Recognized diversity in training/education
  - Decision to give TPA made by ED physician*
  - Decision to give TPA made independent of labs*
  - TPA administration by pharmacy
  - NIHSS done by nursing and EDP

# Reaching out to providers

- Consideration of TPA contraindications
  - TPA & endovascular treatment are the treatments for CVA
- ED Provider owns the decision to treat
  - Role of collaboration
- Convincing providers TPA was beneficial
- Decided consultants would not second guess decision

# Changing the internal culture

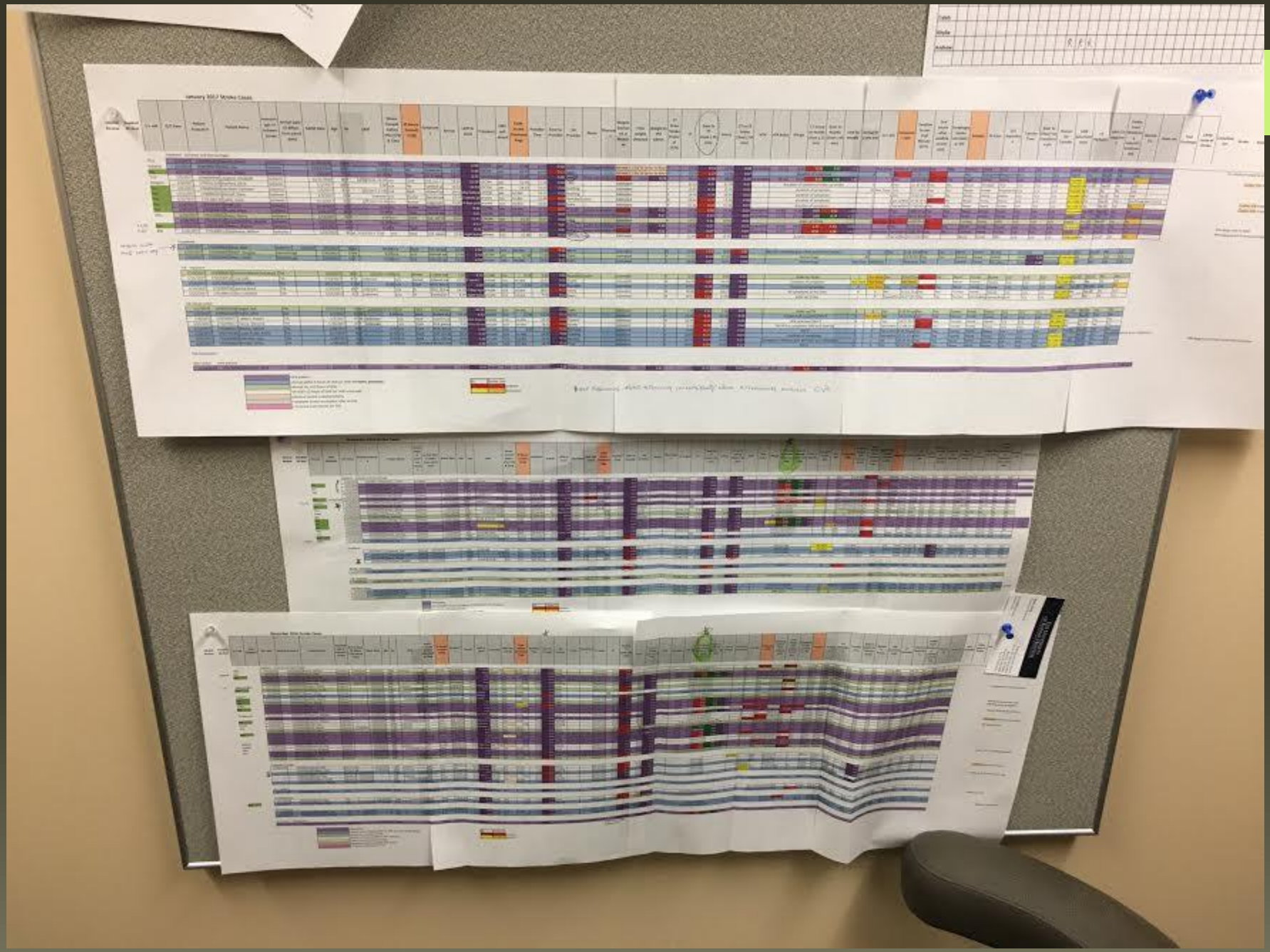
- **Pharmacist** immediately involved
  - Mix TPA early
  - Review contraindications too
- **Radiology** agreed to prioritize studies
  - Code Stroke
- **Labs** done emergent
  - Not always waiting on labs

# Addressing the external culture

- EMS is vital component of stroke care
- Reached out to comprehensive stroke center (CSC)

# Keeping success going

- Ensuring quality continues
- Touting success
- Success is contagious
- Looking for areas of improvement



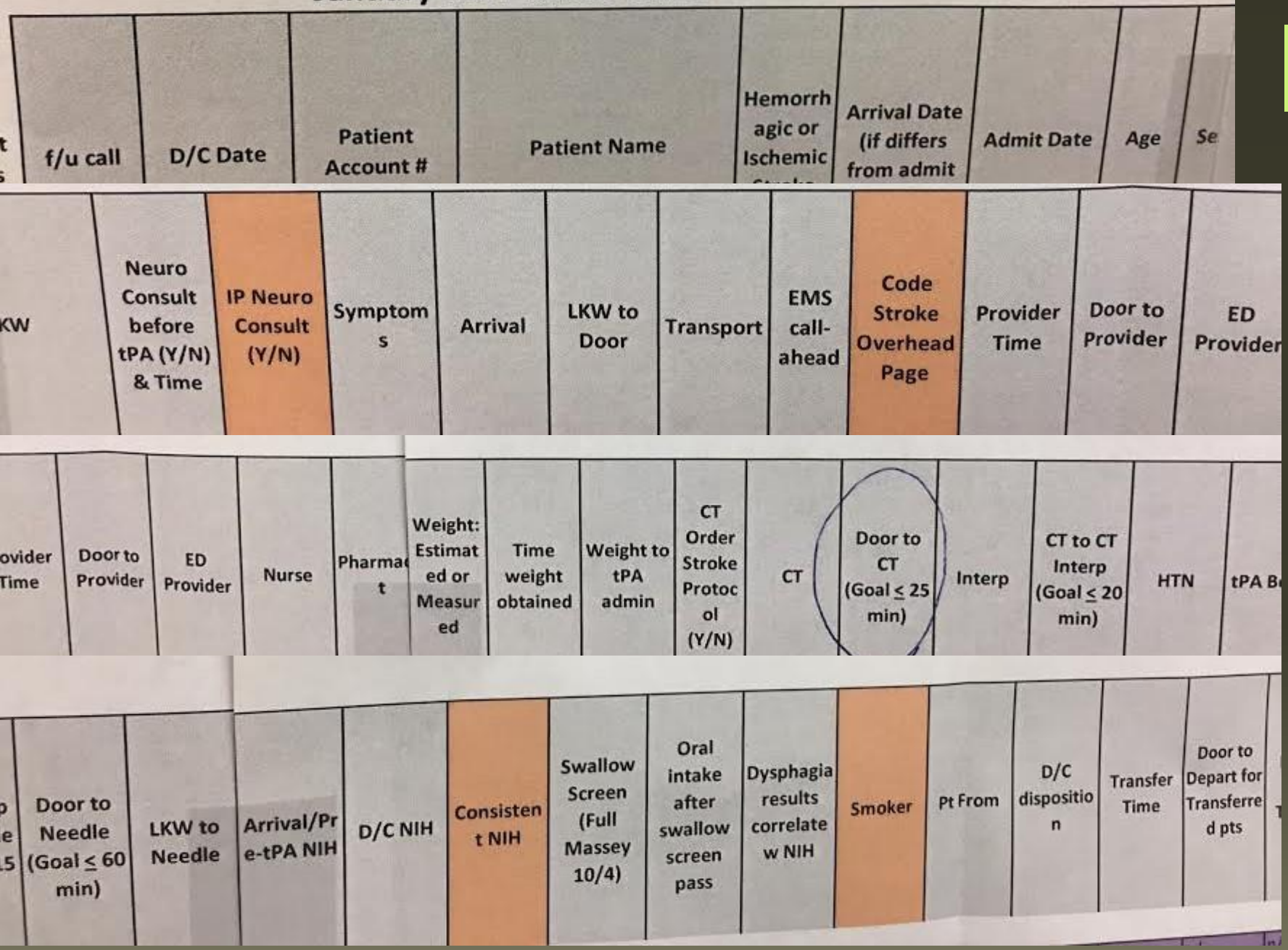
| hemorrh ic or hemic troke | Arrival Date (if differs from admit date) | Admit Date | Age | Se | LKW | Neuro Consult before tPA (Y/N) & Time | IP Neuro Consult (Y/N) | Symptoms | Arrival | LKW to Door | Transport | EMS call-ahead | Code Stroke Overhead Page | Provider Time | Door to Provider | ED Provider | Nurse | Pharmacist | Weight: Estimated or Measured | Time weight obtained |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| chemic | | 12/29/2016 | 60 | M | 9:00 | No | Clark | Weakness | 11:40 | 2:40 | LDCFM | yes | 11:46 | 11:40 | 0:00 | Loney | Cavanaugh | Aversma | Arrived 12/29/16 (pri | |
| schemic | | 12/29/2016 | 81 | F | 11:30 | n/a | No | Unable to v | 14:10 | 2:40 | LDCFM | yes | 14:29 | 14:23 | 0:13 | Trent | | | Arrived 12/29/16 (prk | |
| schemic | | 1/1/2017 | 77 | M | 18:10 | No | Beck | HA, R-sided | 18:45 | 0:35 | Leavenwor | yes | 18:45 | 18:45 | 0:00 | Evans | Emily John | Abby He | Estimated | 18:47 |
| schemic | | 12/31/2016 | 90 | F | 12/30/2016 23:00 | n/a | Clark | LUE, LLL, L | 11:14 | 12:00 | LDCFM | yes | 11:14 | 11:14 | 0:00 | Trent | | | Estimated | |
| schemic | | 1/1/2017 | 100 | F | 0:00 | n/a | No | Garbled sp | 14:53 | 14:53 | LDCFM | yes | 14:53 | 14:53 | 0:00 | Goetting | | | Estimated | |
| schemic | | 1/3/2017 | 61 | F | 1/2/2017 17:00 | n/a | Beck | Altered Spe | 19:42 | day before | LDCFM | yes | no doc | 19:57 | 0:15 | Goetting | | | Estimated | |
| schemic | | 1/9/2017 | 72 | F | Unknown | n/a | Kumar | Slurred spe | 12:27 | 2 weeks pr | private | n/a | no doc | 12:49 | 0:22 | Slanczka/Gustin | | | Estimated | |
| schemic | | 1/11/2017 | 73 | F | 1/7/2017 12:00 | n/a | Kumar | Inappropri | 15:05 | 4 days prio | private | n/a | no doc | 15:05 | 0:00 | Evans | | | Estimated | |
| schemic | | 1/14/2017 | 69 | F | 13:45 | No | Kumar | dizziness | 14:33 | 0:48 | LDCFM | yes | no doc | 15:10 | 0:37 | Prewett | Lauren Cav | Lauren A | Estimated | 14:44 |
| schemic | | 1/18/2017 | 81 | F | 20:00 | N | Clark | slurred spe | 20:51 | 0:51 | LDCFM | yes | no doc | 20:58 | 0:07 | Slanczka/P | Mallory Sm | Abby He | Measured | 20:58 |
| schemic | | 1/21/2017 | 72 | F | 2:00 | n/a | Clark | LUE, LLE nu | 13:41 | 11:41 | LDCFM | yes | 13:47 | 13:47 | 0:06 | Evans | | | Estimated | |
| schemic | | 1/27/2017 | 48 | F | 11:00 | Beck | | Severe occ | 13:11 | 2:11 | private | n/a | 13:20 | 13:35 | 0:0 | Evans | Caitlin Bow | Michael | Measured | 13:14 |
| schemic | | 1/21/2017 | 61 | F | 9:30 | N | Clark | LUE, LLE w | 10:05 | 0:35 | LDCFM | yes | 10:02 | 10:05 | 0:0 | Evans | Kacee Gibl | Debra Al | Estimated | 10:19 |
| schemic | | 1/24/2017 | 81 | M | 1/23/2017 2250 | n/a | Beck | LUE weakn | 15:22 | night befor | private | n/a | 15:38 | 15:23 | 0:01 | Slanczka/Evans | | | Estimated | |
| schemic | 1/4/2017 | 1/5/2017 | 58 | M | 20:30 | n/a | Beck | HA, vertigo | 22:24 | 1:54 | private | n/a | no doc | 22:50 | 0:26 | Herrin | | | Estimated | |
| Hemorrhage | | 1/30/2017 | 57 | M | 9:00 | n/a | n/a | Altered me | 17:43 | 8:43 | LDCFM | yes | 17:48 | 17:48 | 0:00 | Trent | | | Estimated | |
| Hemorrhage | | 1/31/2017 | 55 | F | 15:00 | n/a | n/a | Altered spe | 19:10 | 4:10 | private | n/a | no doc | 19:22 | 0:12 | Evans | | | Estimated | |
| po TIA | | 1/9/2017 | 80 | F | 1/8/2017 2100 | n/a | Kumar | L sided wea | 5:15 | 8:15 | private | n/a | 5:19 | 5:19 | 0:04 | Reynolds/Gustin | | | Estimated | |
| TIA | | 1/13/2017 | 87 | F | unknown | n/a | Kumar | Altered me | 13:29 | 2 weeks | private | n/a | no doc | 13:37 | 0:08 | Gustin | | | Estimated | |
| TIA | | 1/17/2017 | 71 | M | 10:00 | n/a | Clark | RUE, RLE w | 17:28 | 7:28 | private | n/a | 17:43 | 17:40 | 0:12 | Reynolds | | | Estimated | |
| TIA | | 1/23/2017 | 88 | F | unknown | n/a | N | RUE, RLE w | 18:10 | 2 days ago | private | n/a | no doc | 18:32 | 0:22 | Loney | | | Estimated | |
| TIA | | 1/24/2017 | 91 | F | unknown | n/a | N | Confusion | 9:35 | night befor | private | n/a | no doc | 9:39 | 0:04 | Evans | | | Estimated | |
| TIA | | 12/31/2016 | 75 | M | 12/30/2016 20:45 | n/a | Clark | LLE weane | 7:03 | 10:18 | private | n/a | no doc | 7:13 | 0:10 | Trent | | | Estimated | |
| TIA | | 1/2/2017 | 53 | M | 8:30 | n/a | Beck | R sided blu | 13:19 | 4:49 | private | n/a | 13:36 | 13:32 | 0:13 | Herrin | | | Estimated | |
| TIA | | 1/3/2017 | 47 | M | Unknown | n/a | Beck | memory lo | 15:57 | this morni | private | n/a | no doc | 16:16 | 0:19 | Prewett | | | Estimated | |
| TIA | | 1/20/2017 | 87 | F | Unknown | n/a | Clark | RUE parest | 7:45 | Prior to arr | private | n/a | no doc | 8:01 | 0:16 | Pirotte | | | Estimated | |
| TIA | | 1/20/2017 | 70 | F | 3:30 | n/a | Clark | RUE, RLE w | 5:06 | 1:36 | private | n/a | 5:32 | 5:26 | 0:20 | Reynolds | | | Estimated | |
| TIA | | 1/27/2017 | 40 | F | 16:00 | n/a | Beck | LUE numbr | 19:32 | 3:32 | private | n/a | no doc | 19:40 | 0:08 | Goetting | | | Estimated | |
| TIA | | 1/28/2017 | 43 | F | 14:00 | n/a | Beck | LLL, LUE ha | 15:10 | 1:10 | private | n/a | no doc | 15:21 | 0:11 | Korosac | | | Estimated | |
| TIA | | 1/30/2017 | 82 | F | 16:00 | n/a | Consulted | Acute conf | 18:48 | 2:48 | private | n/a | no doc | 19:00 | 0:12 | Trent | | | Estimated | |
| Ischemic | | 1/17/2017 | 53 | F | 7:00 | Clark | | slurred spe | 13:40 | 6:40 | private | n/a | 13:50 | 13:50 | 0:10 | Gustin | Erin Whitt | Cynthia A | Measured | 13:42 | 0:41 |

=tPA patient
=Arrival within 6 hours of LKW (or LKW unknown, pounded)

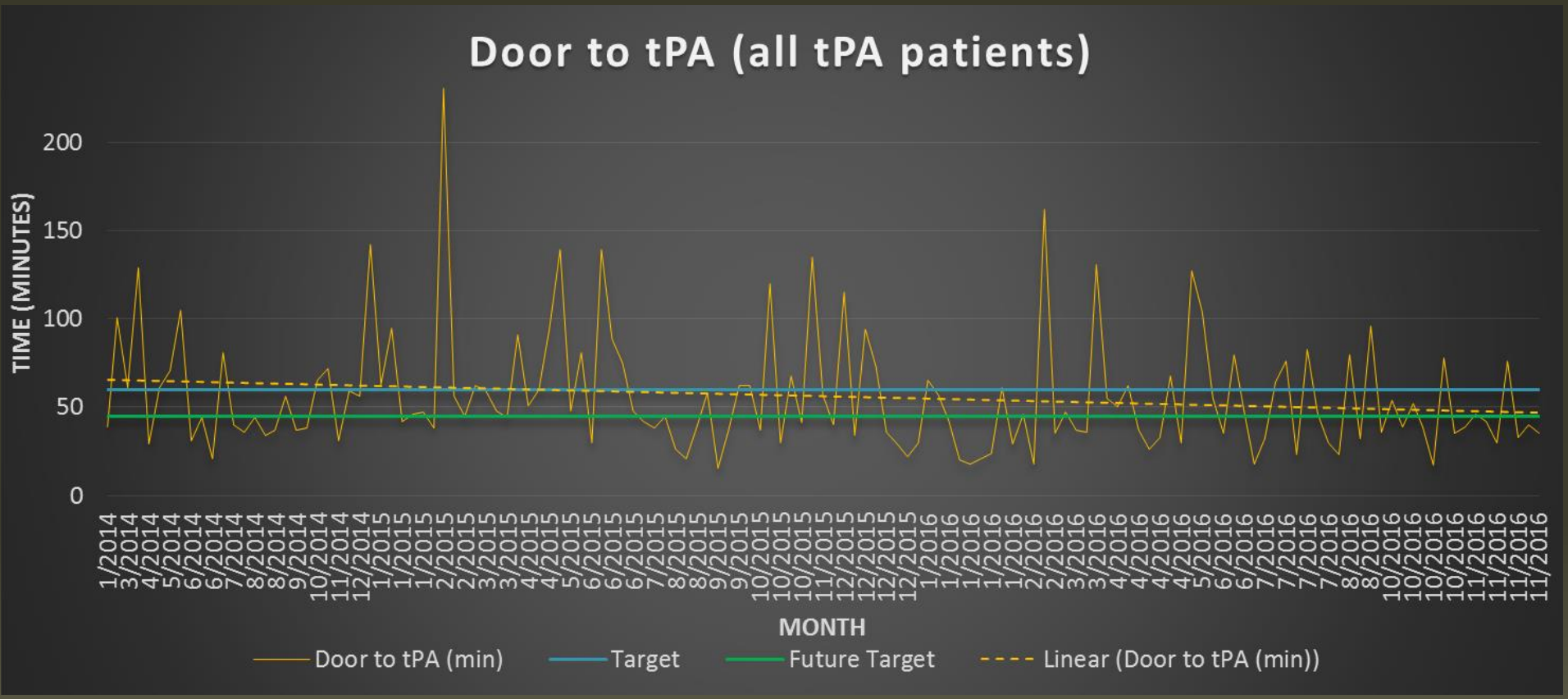
| ED | Stroke Unit | |
|---|---|---|
| | | problem |

Hand Restraints Alert Attending

# January 2017 Stroke Cases



| f/u call | D/C Date | Patient Account # | Patient Name | Hemorrhagic or Ischemic Stroke | Arrival Date (if differs from admit | Admit Date | Age | Se |
|---|---|---|---|---|---|---|---|---|
| KW | Neuro Consult before tPA (Y/N) & Time | IP Neuro Consult (Y/N) | Symptoms | Arrival | LKW to Door | Transport | EMS call-ahead | Code Stroke Overhead Page | Provider Time | Door to Provider | ED Provider |
| ovider Time | Door to Provider | ED Provider | Nurse | Pharmat | Weight: Estimated or Measured | Time weight obtained | Weight to tPA admin | CT Order Stroke Protocol (Y/N) | CT | Door to CT (Goal ≤ 25 min) | Interp | CT to CT Interp (Goal ≤ 20 min) | HTN | tPA B |
| Door to Needle (Goal ≤ 60 min) | LKW to Needle | Arrival/Pre-tPA NIH | D/C NIH | Consistent NIH | Swallow Screen (Full Massey 10/4) | Oral intake after swallow screen pass | Dysphagia results correlate w NIH | Smoker | Pt From | D/C disposition | Transfer Time | Door to Depart for Transferred pts |


Door to tPA (all tPA patients)
TIME (MINUTES)
200
150
100
50
0
1/2014
3/2014
4/2014
5/2014
6/2014
6/2014
7/2014
8/2014
8/2014
9/2014
10/2014
11/2014
12/2014
11/2015
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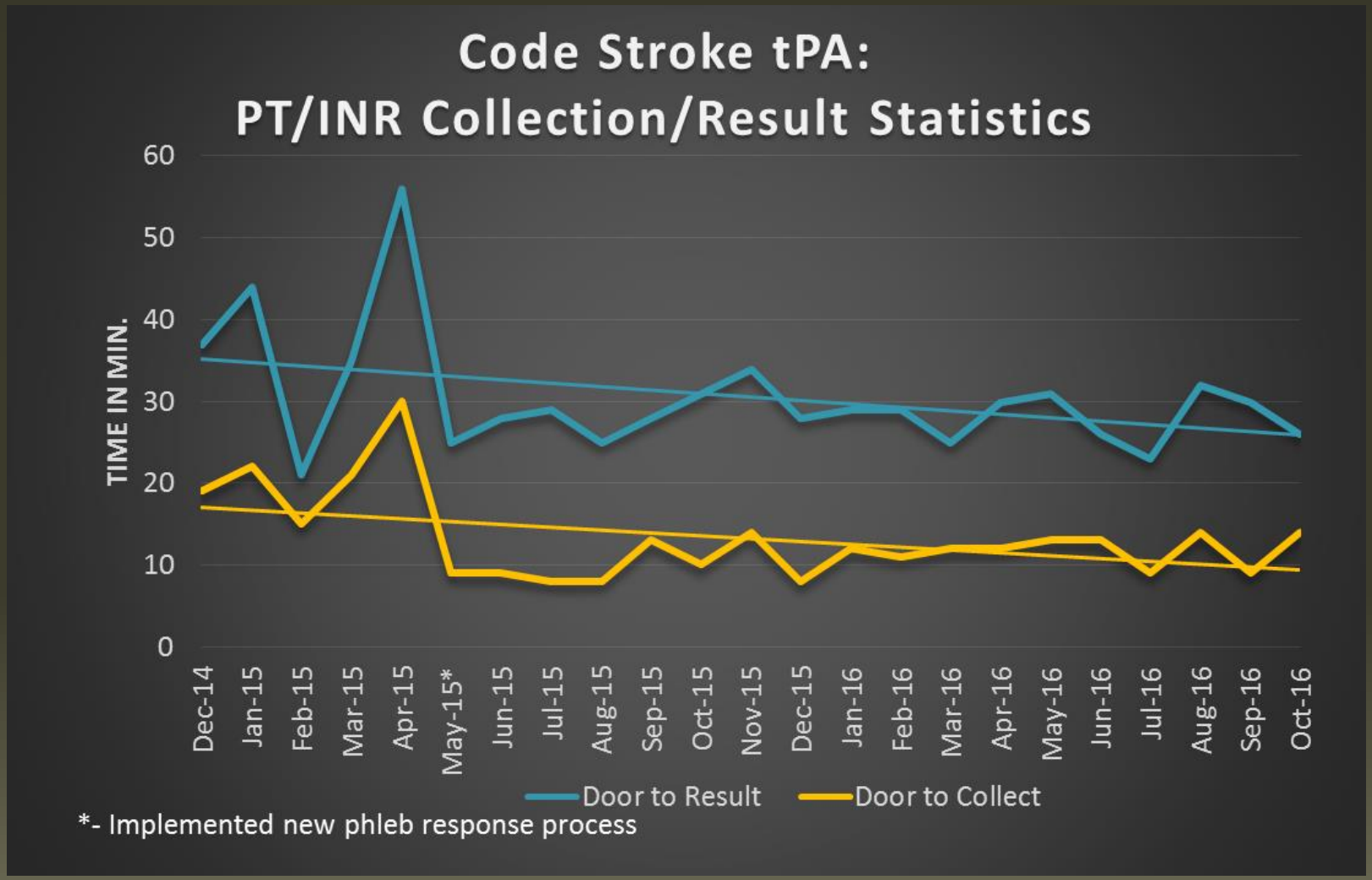
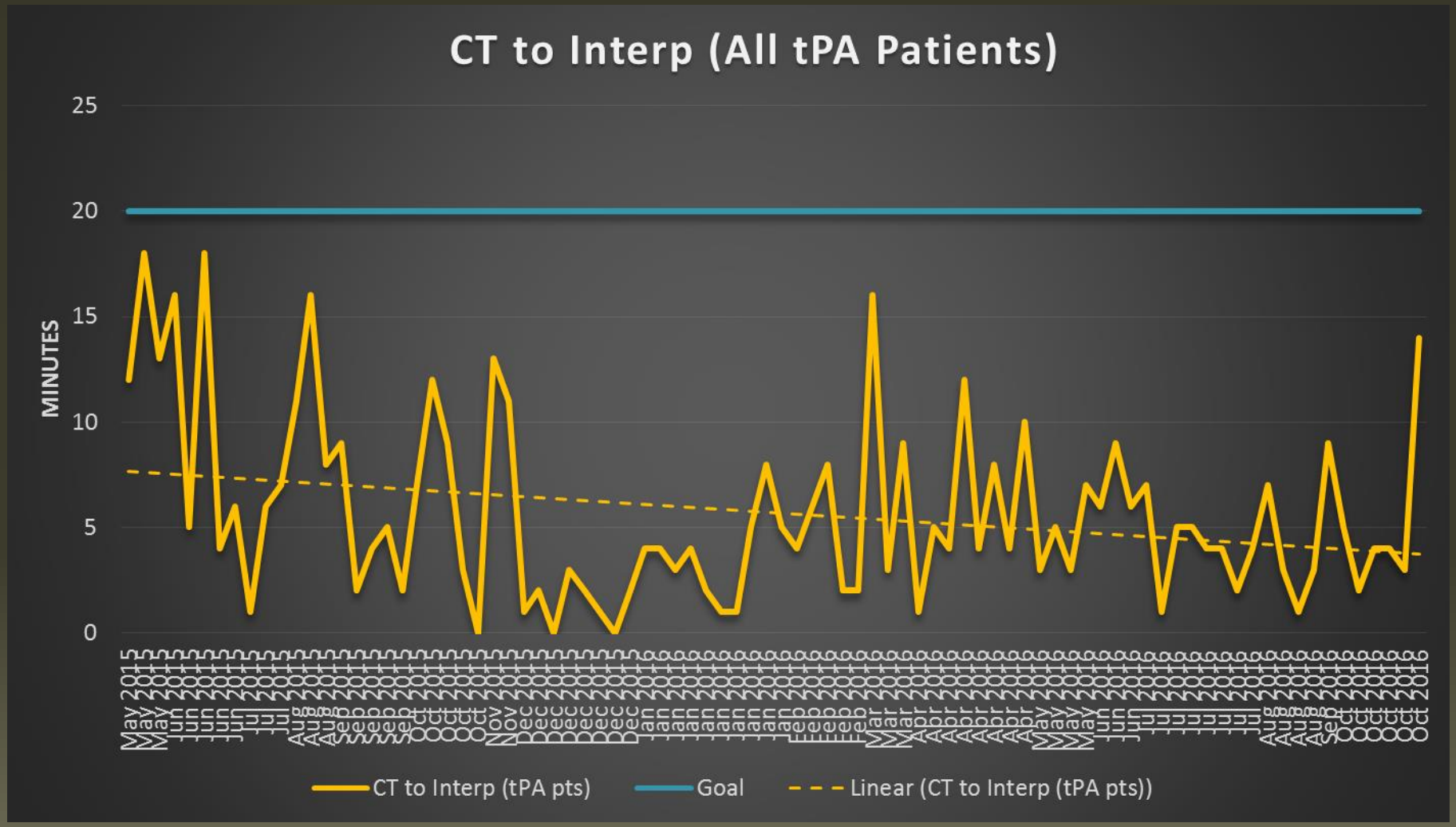
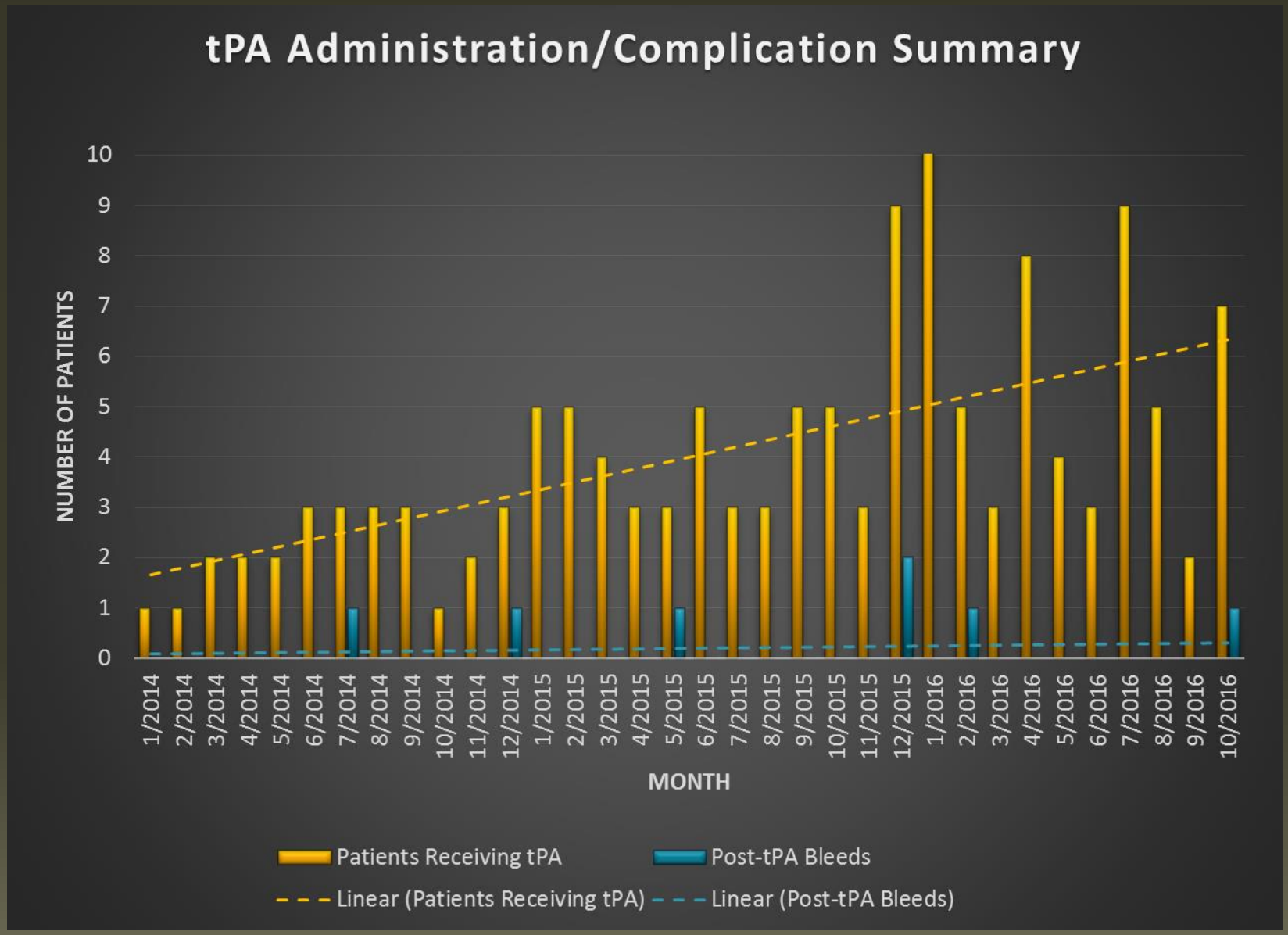
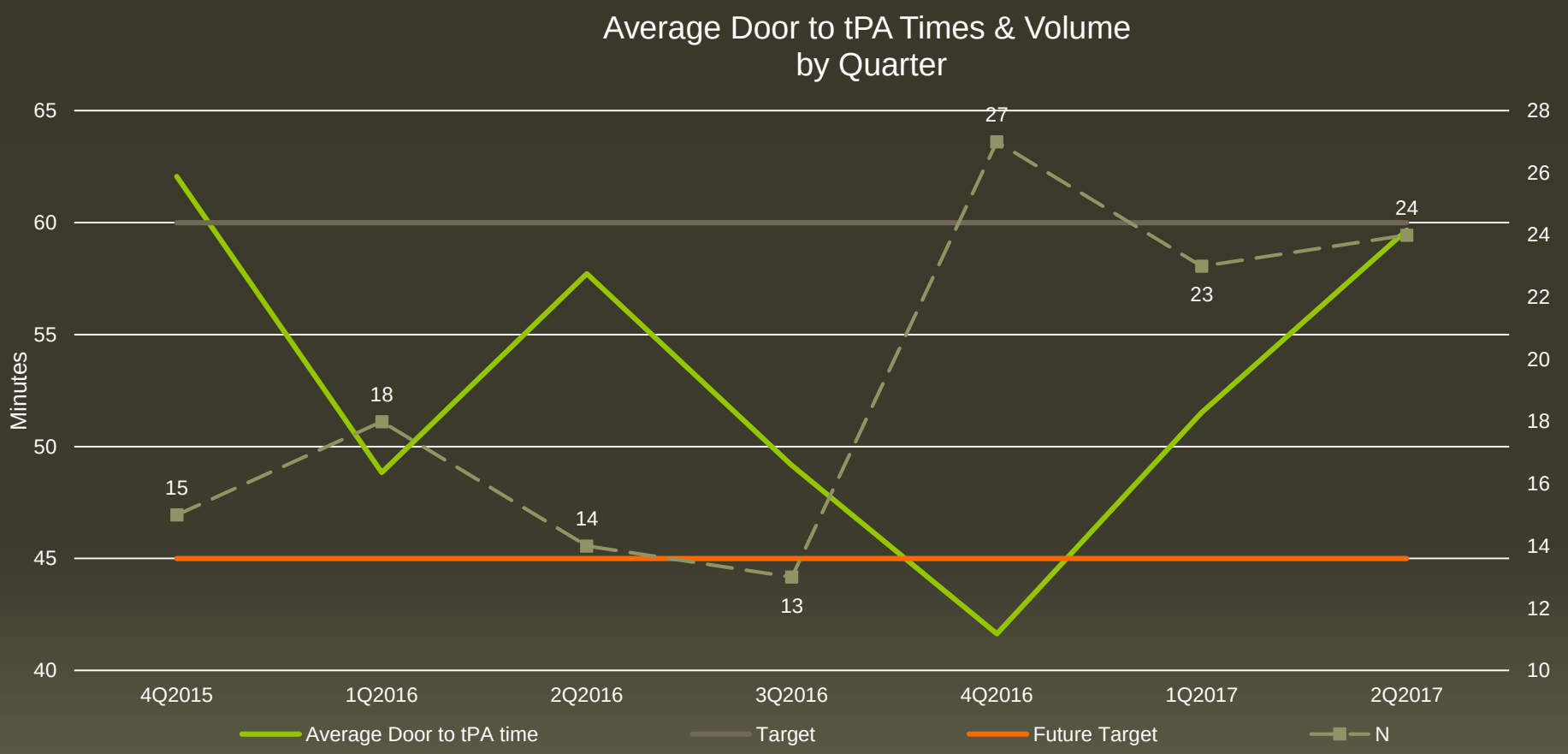
7/2016
8/2016
8/2016
10/2016
10/2016
10/2016
10/2016
11/2016
11/2016
11/2016
11/2016
MONTH
Door to tPA (min)
Target
Future Target
Linear (Door to tPA (min))


Code Stroke tPA:
PT/INR Collection/Result Statistics
TIME IN MIN.
60
50
40
30
20
10
0
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15*
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Door to Result
Door to Collect
*- Implemented new phleb response process


CT to Interp (All tPA Patients)
MINUTES
25
20
15
10
5
0
CT to Interp (tPA pts)
Goal
Linear (CT to Interp (tPA pts))

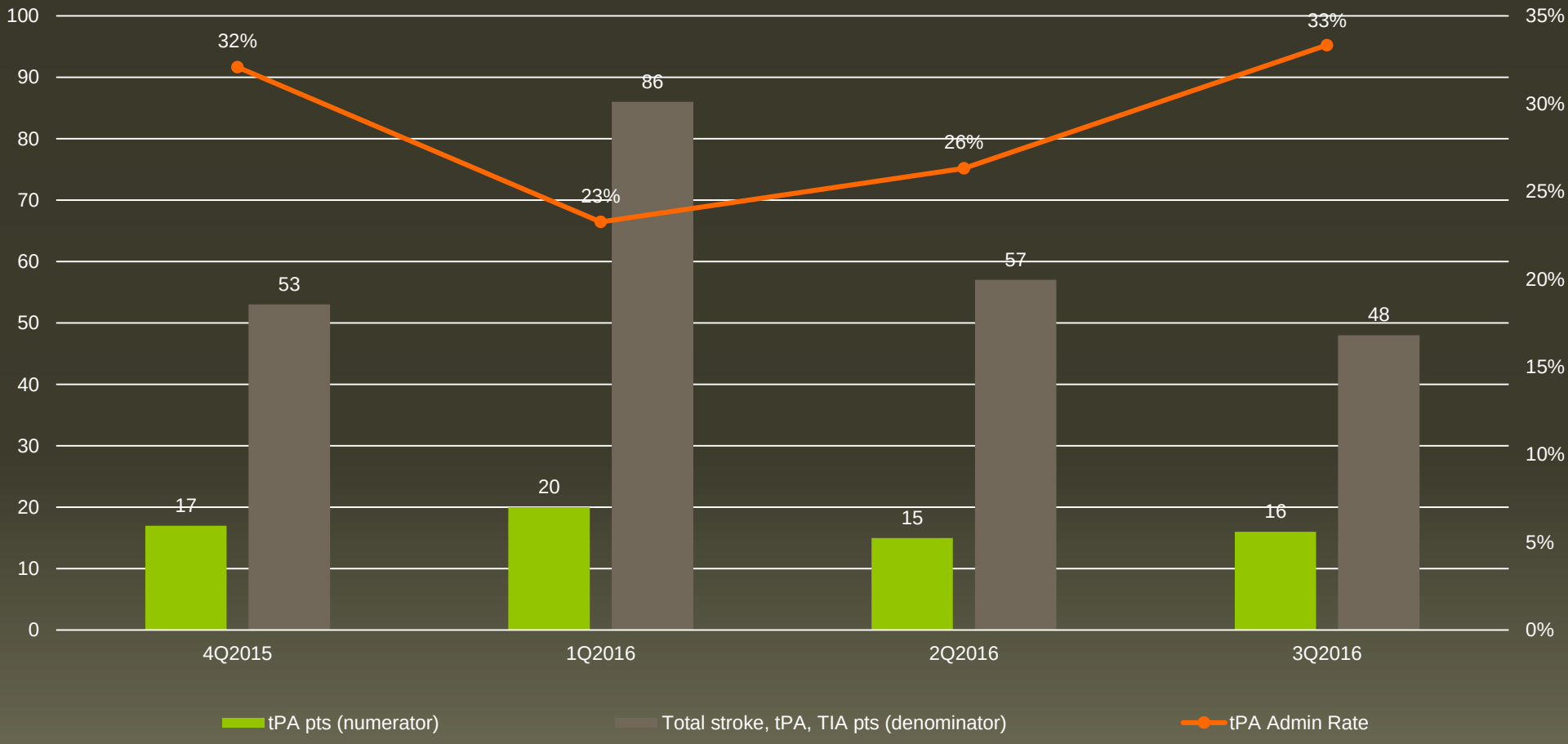

tPA Administration/Complication Summary
NUMBER OF PATIENTS
0
1
2
3
4
5
6
7
8
9
10
1/2014
2/2014
3/2014
4/2014
5/2014
6/2014
7/2014
8/2014
9/2014
10/2014
11/2014
12/2014
1/2015
2/2015
3/2015
4/2015
5/2015
6/2015
7/2015
8/2015
9/2015
10/2015
11/2015
12/2015
1/2016
2/2016
3/2016
4/2016
5/2016
6/2016
7/2016
8/2016
9/2016
10/2016
MONTH
Patients Receiving tPA
Post-tPA Bleeds
Linear (Patients Receiving tPA)
Linear (Post-tPA Bleeds)

# tPA Administration Times

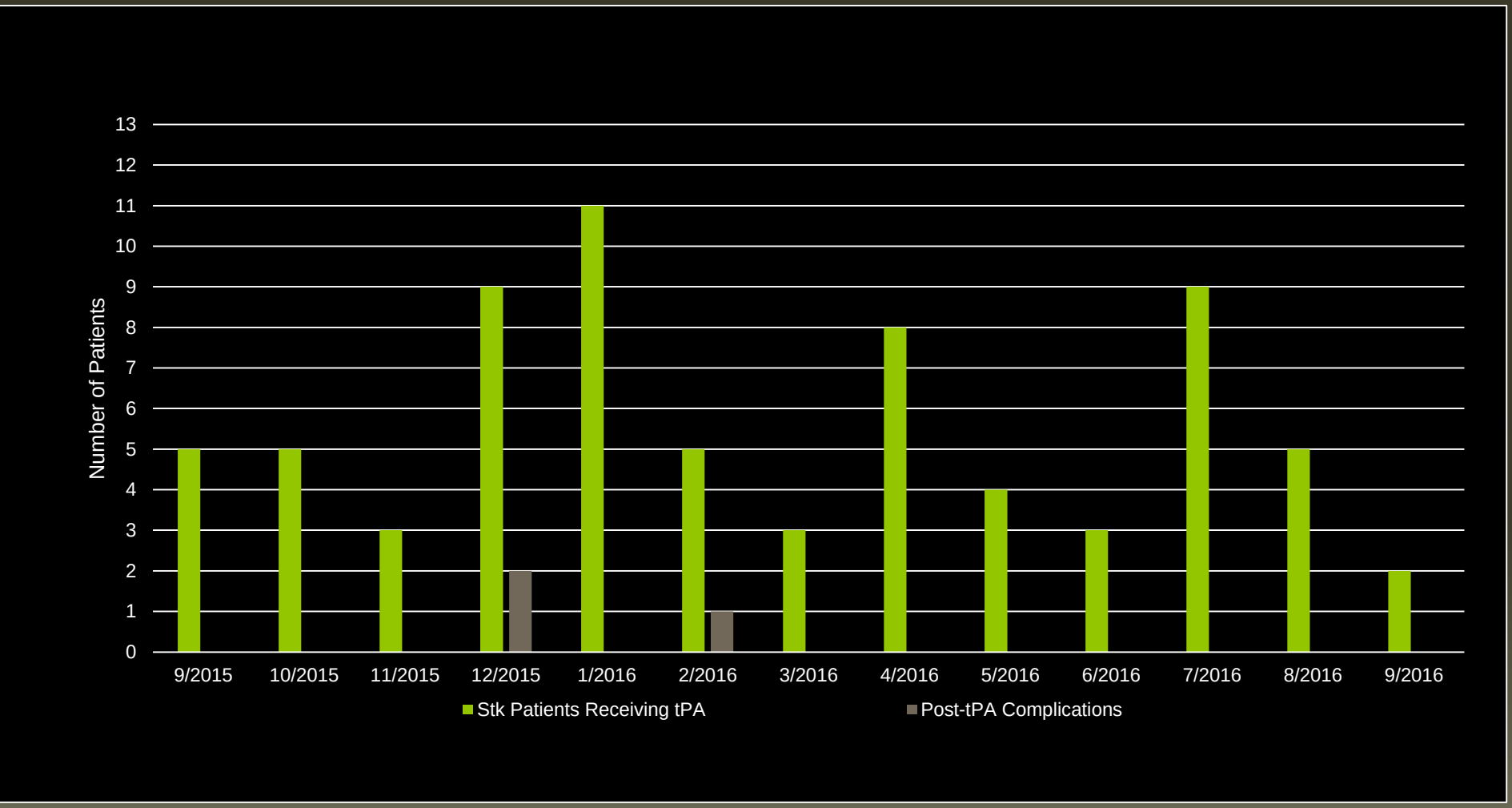


# tPA Rate




100
90
80
70
60
50
40
30
20
10
0
35%
30%
25%
20%
15%
10%
5%
0%
32%
23%
26%
33%
17
53
20
86
15
57
16
48
4Q2015
1Q2016
2Q2016
3Q2016
tPA pts (numerator)
Total stroke, tPA, TIA pts (denominator)
tPA Admin Rate

# tPA Administration & Complication Summary

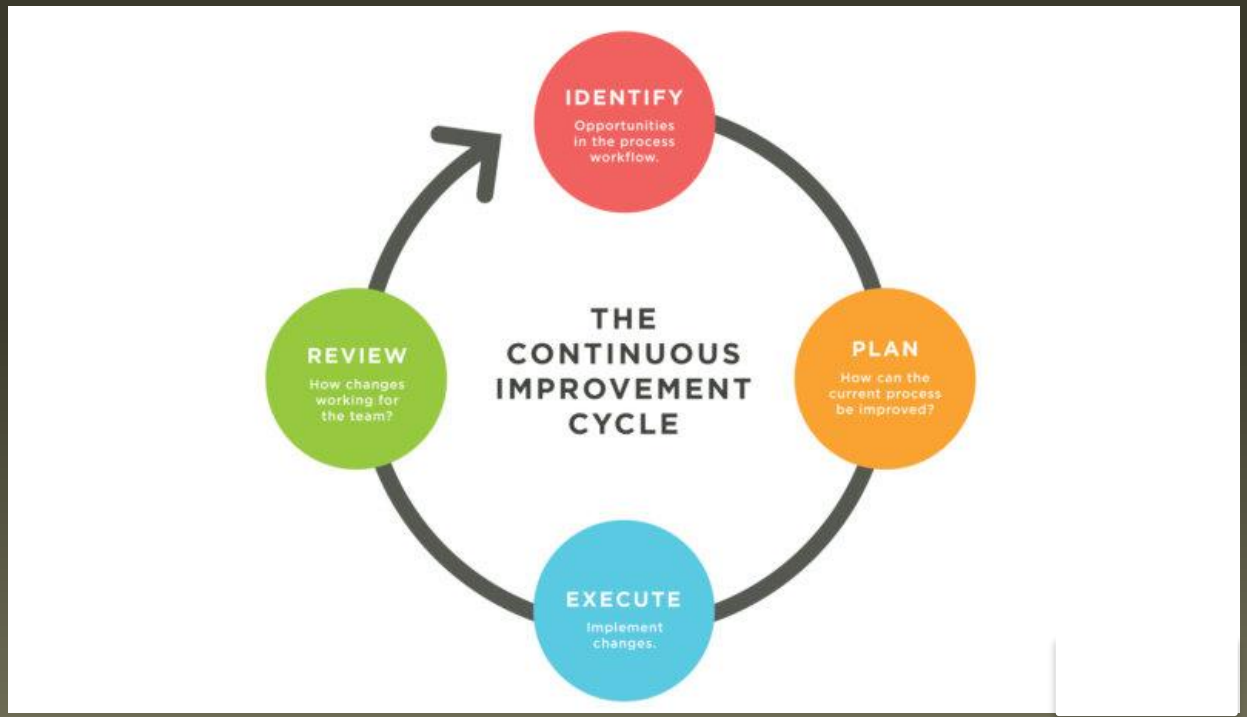


# Door to tPA Time Drill-Down

September 2015 – September 2016

| Average Door to CT | Average CT to CT Interpretation | Average CT to TPA admin | Average Door to tPA |
|---|---|---|---|
| Goal < 25 min<br><br>LMH **16 minutes** | Goal ≤ 20 Minutes<br><br>LMH **5 Minutes** | Goal ≤ 15 Minutes<br><br>LMH **33 Minutes** | Goal ≤ 60 Minutes<br><br>LMH **54 Minutes** |

# Questions?


IDENTIFY
Opportunities in the process workflow.
PLAN
How can the current process be improved?
EXECUTE
Implement changes.
REVIEW
How changes working for the team?
THE CONTINUOUS IMPROVEMENT CYCLE