

# Effect of standardization on time spent by patients in recovery nursing units after interventional radiology procedures

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*Acknowledgements: Radiology recovery RN team*



# Disclosures

Ashok Srinivasan - Consultant, GE Healthcare

No financial disclosures relevant to this presentation

# What is the problem?

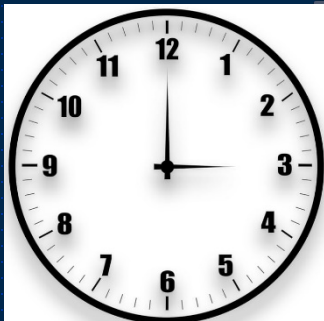
**Table 6. Management Recommendations for Anticoagulant and Antiplatelet Agents (22-3436,110-120) (continued)**

Medication	Low Risk for Bleeding	High Risk for Bleeding*
Fondaparinux (Arixtra)	Do not withhold	Withhold 20 d (ICCI ≥ 50 mL/min) or 3-5 d (ICCI < 50 mL/min)
Reinitiation	NA	24 h
Apixaban (Eliquis)	Do not withhold	Withhold 2-4 h before procedure; check aPTT 4-6 h
Reinitiation	NA	4-6 h
Bivalirudin (AngioBlok)	Do not withhold	Withhold 2-4 h before procedure; check aPTT 4-6 h
Reinitiation	NA	4-6 h
Warfarin (Coumadin)	Withholding: Target INR < 3.0; consider bridging for high thrombosis risk cases. If STAT or emergent, use reversal agent. Reinitiation: NA or same-day reinitiation for bridge patients.	Withhold 5 d until target INR < 1.8; consider bridging for high thrombosis risk cases. If STAT or emergent, use reversal agent. Resume day after procedure; high thrombosis risk cases may benefit from bridging with LMWH and multidisciplinary management especially if reversal agent used along with vitamin K.
Aspirin (Ecotrin)	Do not withhold	Withhold 4 doses (ICCI < 50 mL/min) or 8 doses (ICCI < 30-50 mL/min); if procedure is STAT or emergent, use reversal agent (andexanet alfa); consider checking anti-Xa activity or apixaban level especially with impaired renal function.
Reinitiation	NA	24 h
Betrixaban (Bevyxan)	Do not withhold	Withhold for 3 doses (11); if procedure is STAT or emergent, use reversal agent (andexanet alfa); consider checking anti-Xa activity especially with impaired renal function.
Reinitiation	NA	24 h
Dabigatran (Pradaxa)	Do not withhold	Withhold 4 doses (ICCI < 50 mL/min) or 6-8 doses (ICCI < 30-50 mL/min); if procedure is STAT or emergent, use reversal agent (idaruciclimab); consider checking thrombin time or dabigatran level with impaired renal function.
Reinitiation	NA	24 h
Edoxaban (Savaysa)	Do not withhold	Withhold for 3 doses; if procedure is STAT or emergent, use reversal agent (andexanet alfa); consider checking anti-Xa activity especially with impaired renal function.
Reinitiation	NA	24 h
Rivaroxaban (Xarelto)	Do not withhold	Defer procedure until off medication for 2 doses (ICCI < 50 mL/min), 2 doses (ICCI < 30-50 mL/min), or 3 doses (ICCI < 15-30 mL/min); if procedure is STAT or emergent, use reversal agent (andexanet alfa); consider checking anti-Xa activity or rivaroxaban level especially with impaired renal function.
Reinitiation	NA	24 h
Antiplatelet agents: thienopyridines	Withholding: Do not withhold. Reinitiation: NA.	Withhold for 5 d before procedure. Reinitiation: NA.
Clopidogrel (Plavix)	Do not withhold	Withhold for 5 d before procedure. Reinitiation: NA.
Ticagrelor (Brilinta)	Do not withhold	Withhold for 5 d before procedure. Reinitiation: NA.
Prasugrel (Effient)	Do not withhold	Withhold for 7 d before procedure. Reinitiation: NA.
Cangrelor (Kangrela)	Withholding: Defer procedure until off medication; if procedure is emergent, withhold 1 h before procedure; multidisciplinary discussion with cardiology suggested (110). Reinitiation: Patients receiving cangrelor are undergoing PCI or are within immediate postprocedural period from cardiac intervention; multidisciplinary, shared decision making recommended.	Withhold for 7 d before procedure. Reinitiation: NA.

continued

• While there are society guidelines for withholding anti-coagulation medication for interventional radiology procedures, there are no universally accepted standards for post procedural observation times.

• Variations amongst proceduralists in prescribed recovery times for the same procedure



Increased time spent by nursing staff clarifying the order accuracy (e.g., different providers prescribing 30 minutes versus 2 hours post lumbar punctures)

Decreases room efficiency in a busy practice because it is not possible to predict the length of stay for a particular procedure



The goal of our study was to evaluate the effect of standardizing post procedural observation times for interventional procedures on actual times spent by patients in recovery units.

# What did we do?

Neurointerventional Radiology (NIR)

Vascular Interventional Radiology (VIR)

Neurodiagnostic Radiology (NDR)

Discharge

Discharge

Discharge

Post Procedural  
recovery units

- Each service tasked with creating a consensus guideline document listing various recovery times for each procedure
- Caveat: *Providers are still able to alter the proposed recovery time at their discretion for a particular patient based on special circumstances*

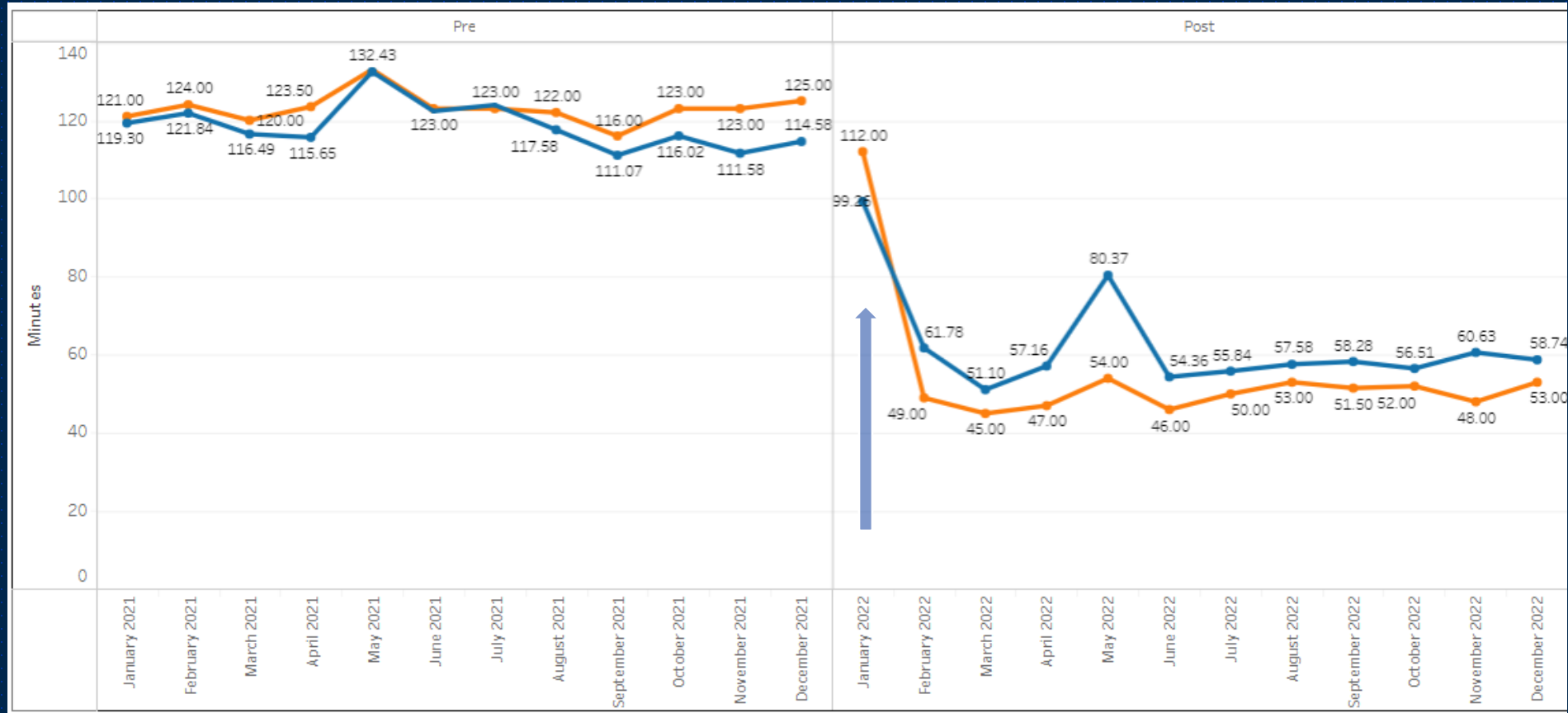
# Consensus guidelines created and shared

Procedure Type	RECOVERY TIME (min)
PCN/NUS Exchange	0
PTC Placement	240
PTC Removal	30
PTC Exchange	30
Transjugular Liver Biopsy	240
Ascending Venogram	30
Descending Venogram	160
Uterine Fibroid Embolization	240
Biopsy (misc.)	180
Fistulagram	30
Fistula De-clotting	60
Port Placement	30
Port Removal	30
Power Port Placement	30
Power Port Removal	30
Tunneled Cath Insert/Exchange	60
Tunneled Cath Removal	30
Tunneled Cath Repair	15
Tunneled Cath De-clotting	15
PICC Placement	15
PICC Removal	15
PICC Repair	15
G/GJ Tube placement	240
G/GJ Tube exchange	15

Procedure Type	RECOVERY TIME (min)
Cerebral Angiogram	Mynx, angioseal, perclose device sealed punctures in groin need 2 hr obs before discharge. The same holds true for TR band hemostased radial puncture. Manual compression groin punctures will need to be observed for 4 hrs.
WADA	180
Myelogram	30
Myelogram/Rad Onc	30
Lumbar Puncture	30
Lumbar Puncture with Chemotherapy	30
Biopsy- Spine or Head and Neck	60

*All changes implemented in Jan 2022*

# Jan-Dec '21 vs Jan-Dec '22



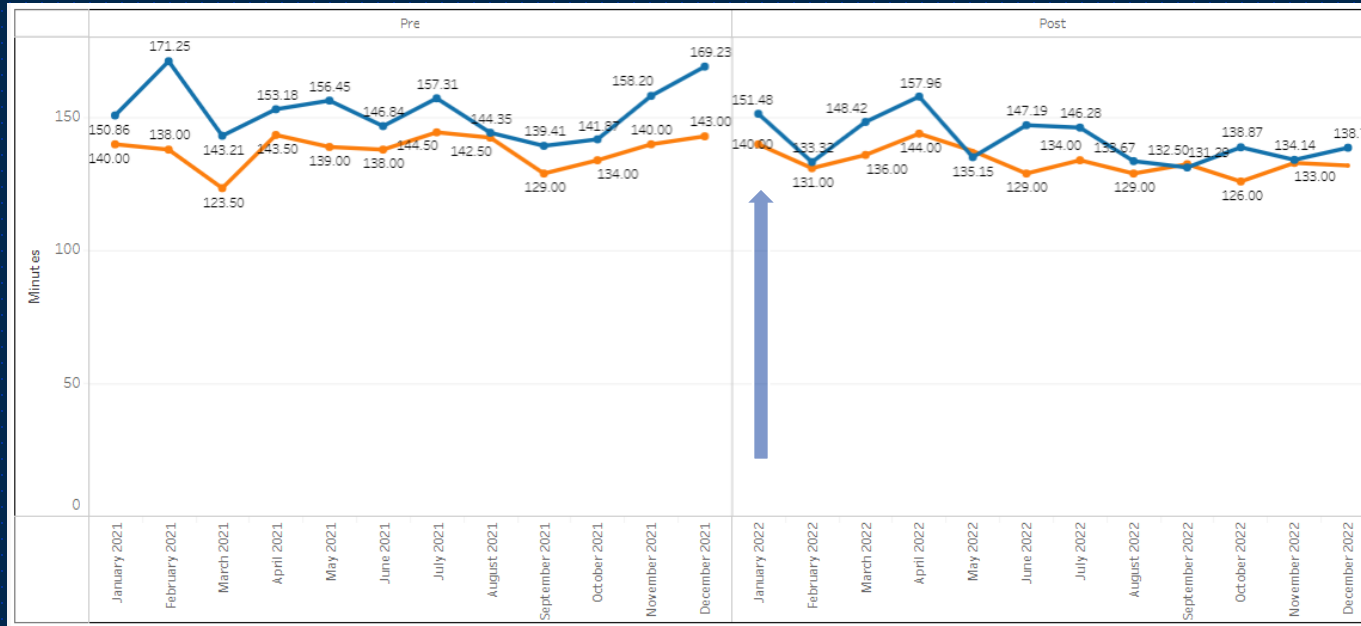
## Neurodiagnostic Radiology

AVE: 119 to 61 min

Median: 123 to 61 min

# Jan-Dec '21 vs Jan-Dec '22

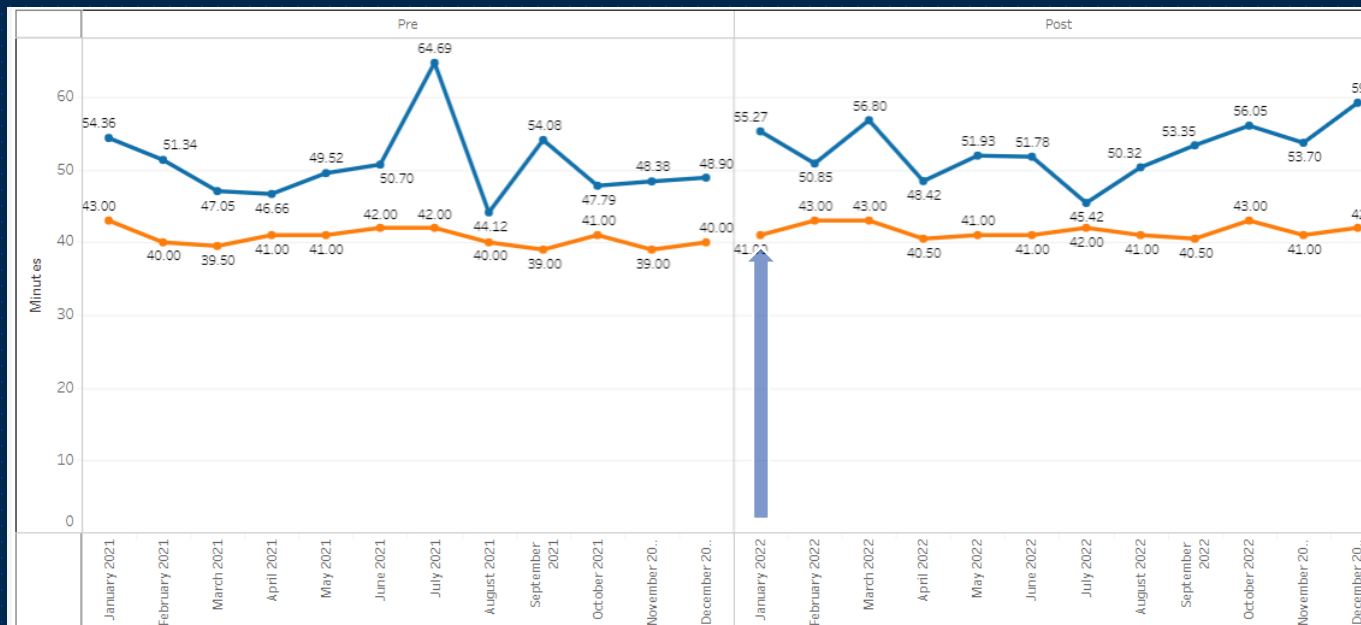
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## Neurointerventional Radiology

AVE: 154 to 143 min

Median: 140 to 134 min

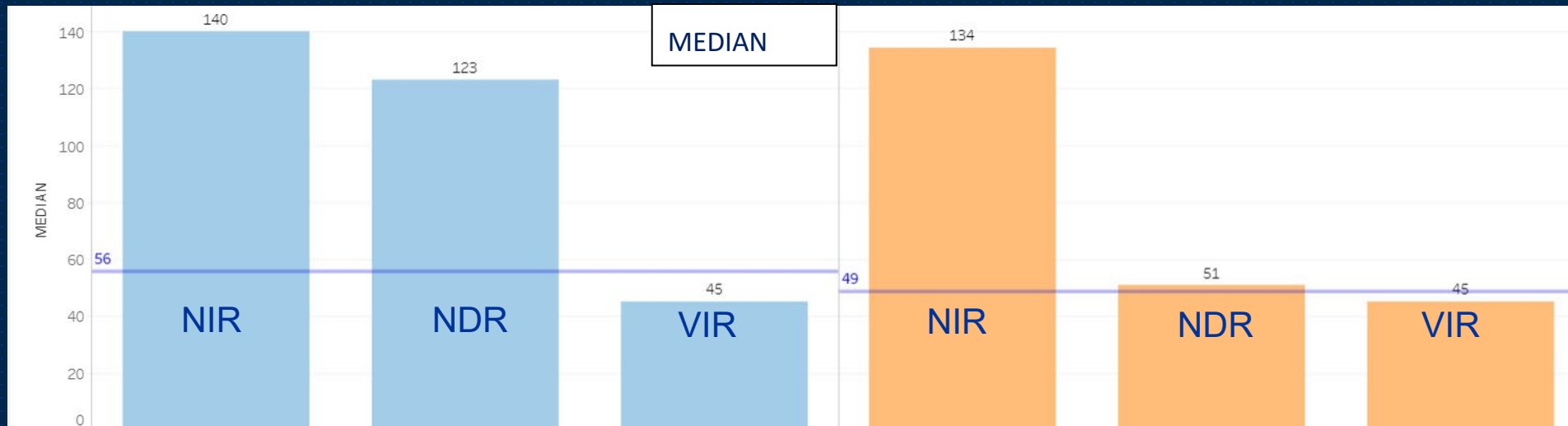
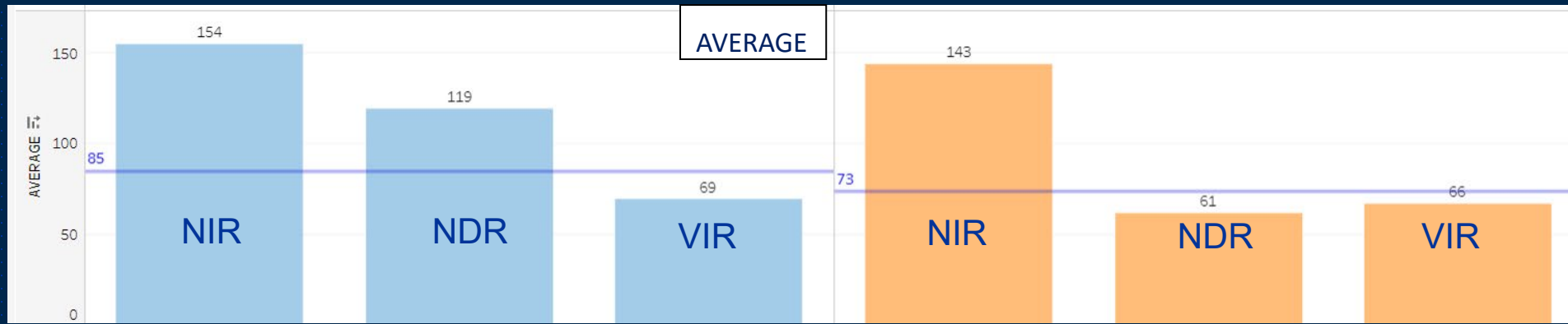


## Vascular Interventional Radiology

AVE: 69 to 66 min

Median: 45 to 45 min

# RESULTS



Overall  
AVE: 85 to 73 min  
Median: 56 to 49 min



# Discussion

- *Process behavior chart demonstrated significant process shift only for NDR procedures and not for NIR and VIR*
- *For absolute numbers, the largest effect was seen in NDR procedures with nearly 50% reduction (both median & average) whereas the change in NIR procedures was 4/8% (median/average) and VIR procedures was 0/4% (median/average)*
- *Greater than 10% reduction in average and median times was achieved overall for all procedures – this impacts time available to recover patients and improves throughput*



*Informal surveys of the nursing staff post implementation revealed a significant drop in phone calls placed for order clarification*



*There were no changes in the number of risk reports related to post procedural complications after implementation*

# CONCLUSION

- Standardization reduces variation (but only when there are significant pre-existing differences)
- Standardization reduces confusion and the need for clarification
- *Even in areas where standardization did not change the times substantially, there was tangible benefit in terms of eliminating many phone calls placed for order clarification.*

