Overnight Neuro MR Triage

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Disclosures

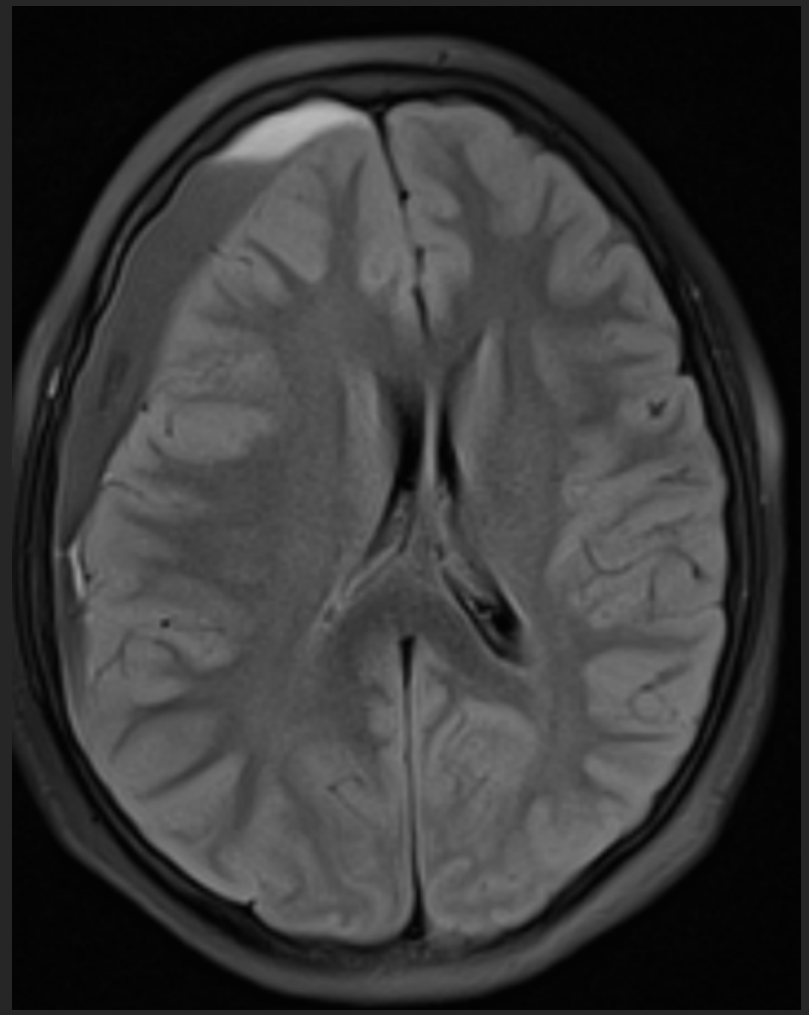
- None

Overnight Neuro MR Requests

1:20 am

11-year old with new headache waking him from sleep, not improving with ibuprofen

Consider hemorrhage, mass, etc.



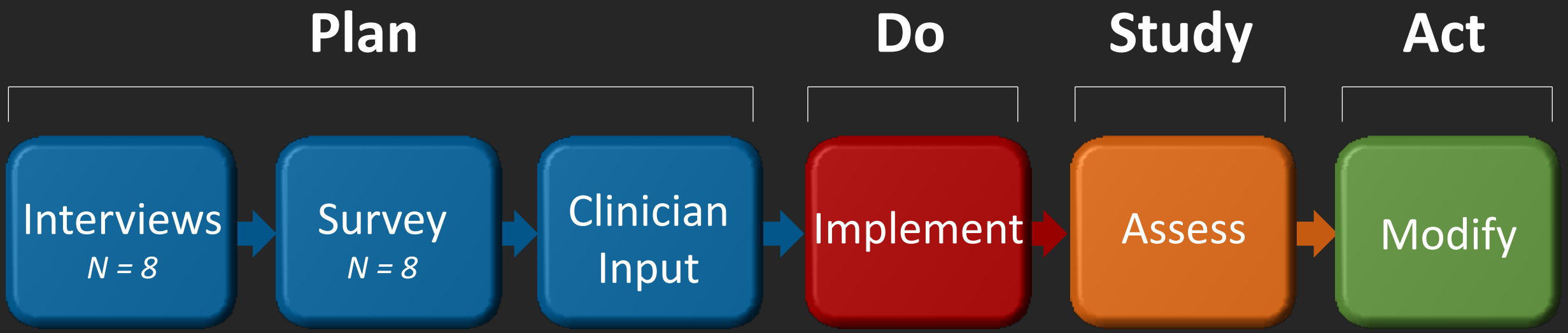
Setting: Children's Hospital of Philadelphia (CHOP)

- 600 beds
- In-house radiology service 10 pm – 7:30 am
  - 4 pediatric body radiologists
- 8 pediatric neuroradiologists cover neuro MR from home

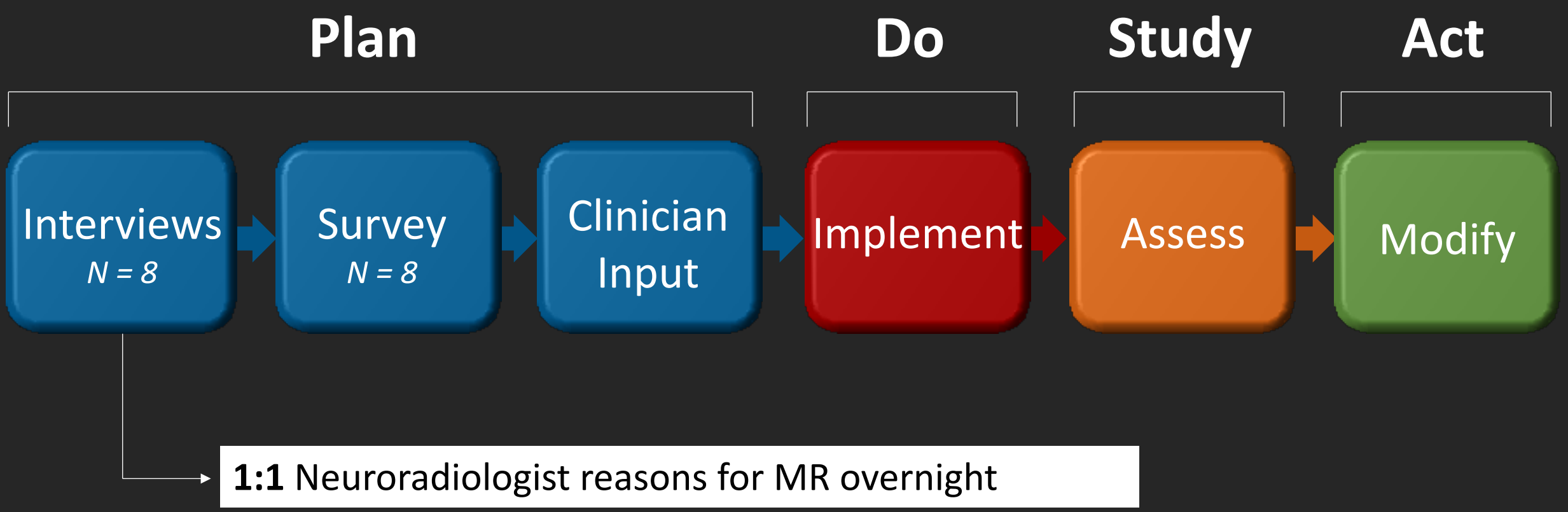
Overnight Neuro MR Requests

- Neuro MR requests overnight may not be medically emergent.
- Excessive waking for low-yield exams leads to fatigue and job dissatisfaction.
- Objectives:
  - Define appropriate emergent uses for neuro MR overnight
  - Test whether pediatric body radiologists can triage neuro MR

Methods


Plan
Do
Study
Act
Interviews
N = 8
Survey
N = 8
Clinician Input
Implement
Assess
Modify

Methods


Plan
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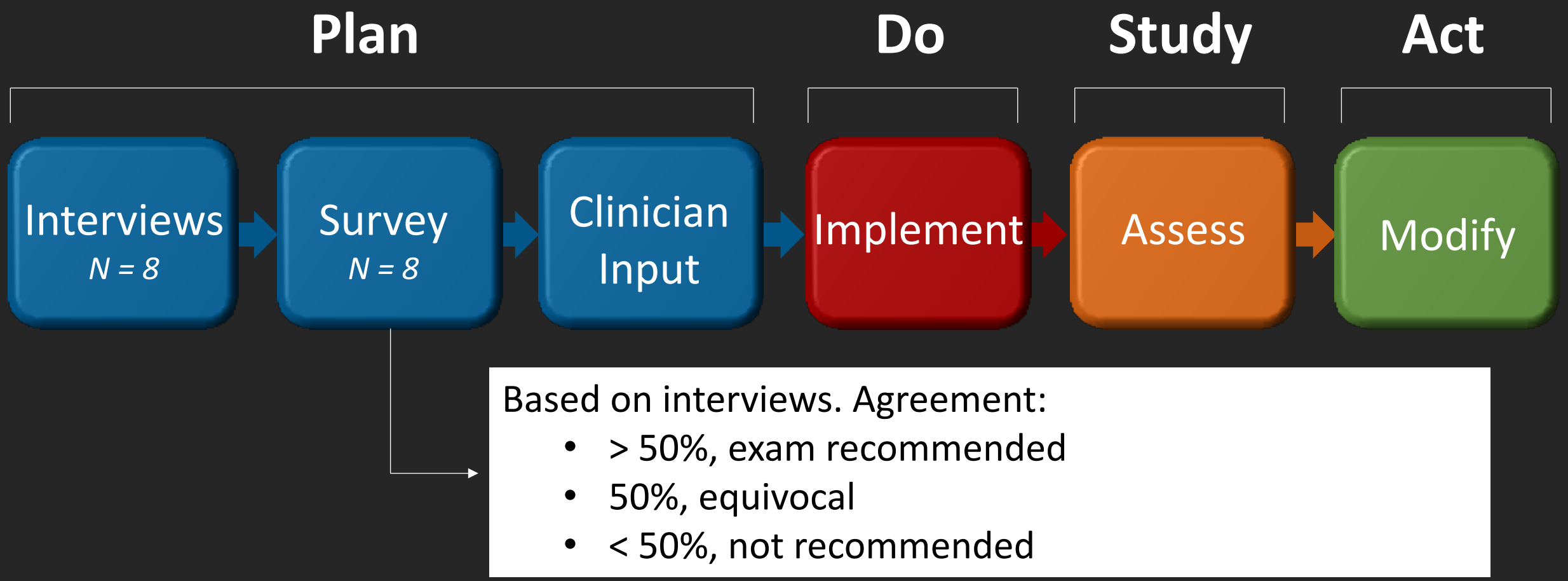
Modify
1:1 Neuroradiologist reasons for MR overnight

Methods


Plan
Do
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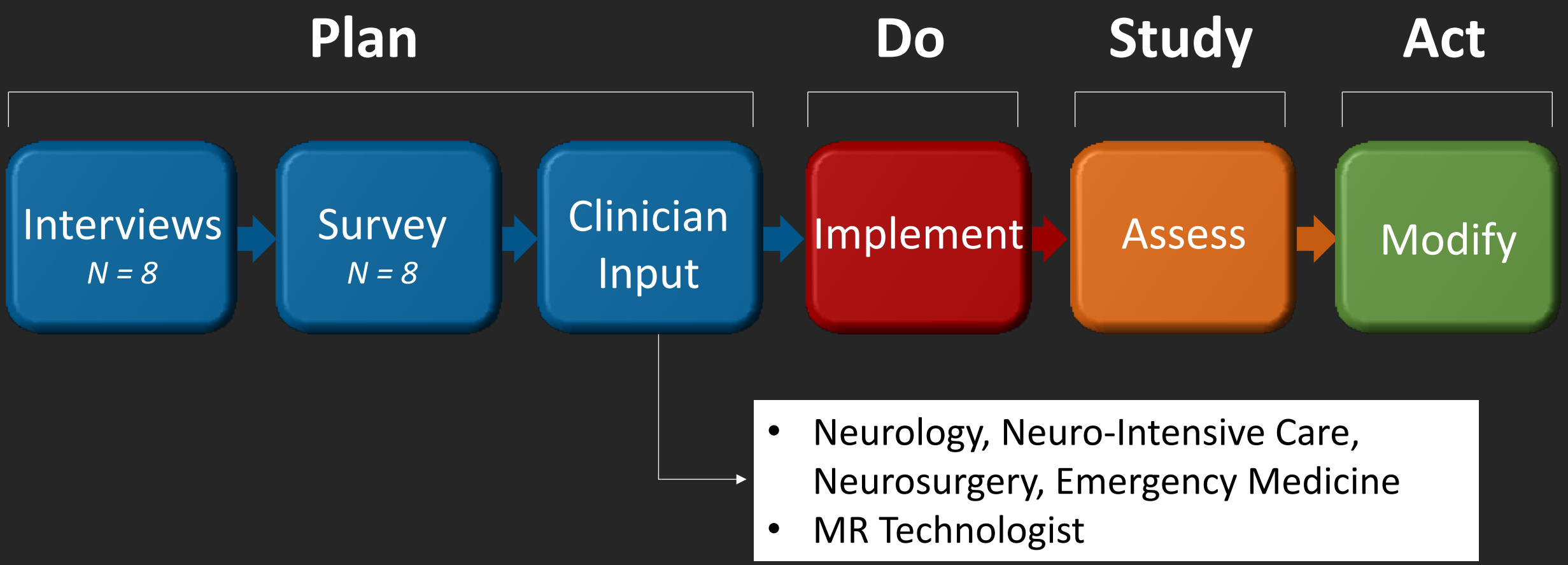
Interviews
N = 8
Survey
N = 8
Clinician Input
Implement
Assess
Modify
Based on interviews. Agreement:
• > 50%, exam recommended
• 50%, equivocal
• < 50%, not recommended

Methods


Plan
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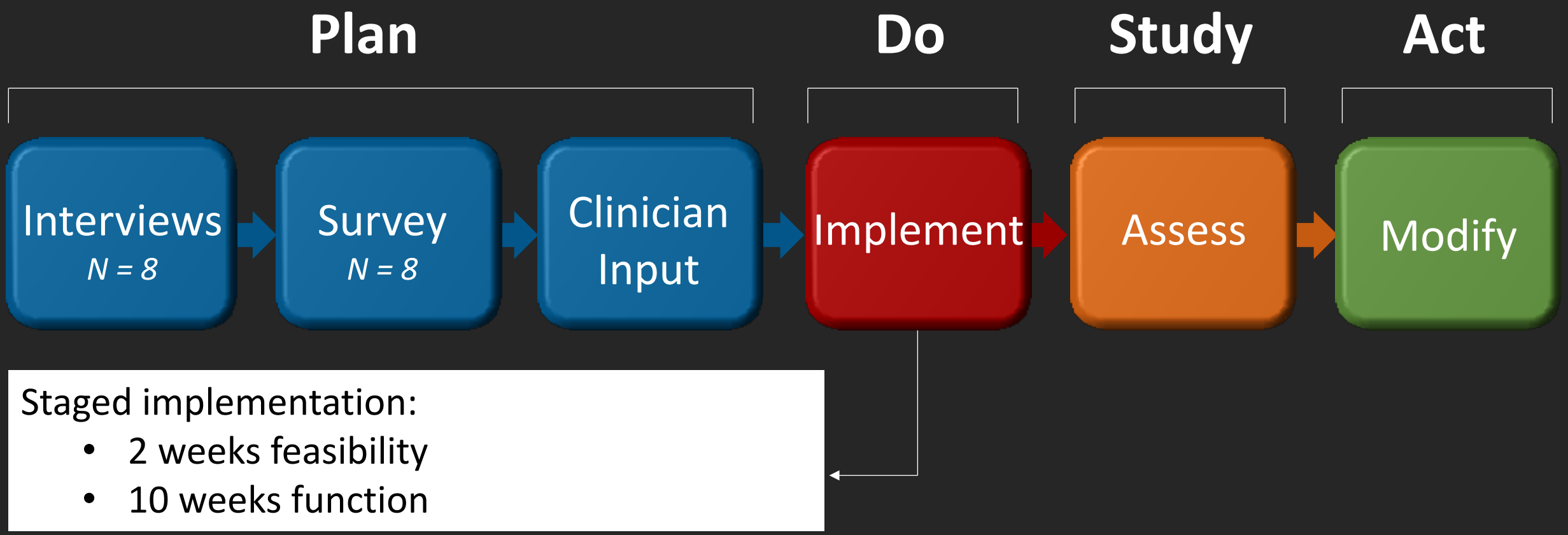
Interviews
N = 8
Survey
N = 8
Clinician Input
Implement
Assess
Modify
• Neurology, Neuro-Intensive Care, Neurosurgery, Emergency Medicine
• MR Technologist

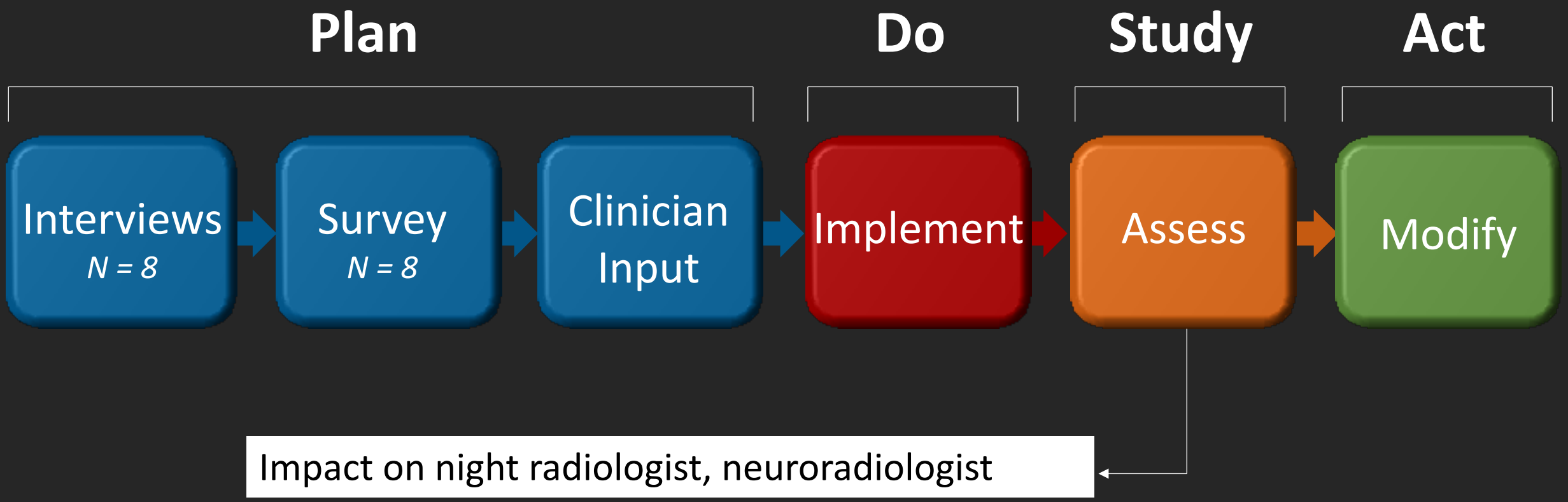
Methods



Staged implementation:

- 2 weeks feasibility
- 10 weeks function

Methods


Plan
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Study
Act
Interviews
N = 8
Survey
N = 8
Clinician Input
Implement
Assess
Modify
Impact on night radiologist, neuroradiologist

Survey: > 50% Agreement

Brain			
	Rapid (rMR)	Routine	Recommend
Stroke	88%	12%	rMR
Intracranial pressure	75%	12%	rMR
Abscess / empyema by CT/MR	0%	63%	routine
Critical abnormality by CT/MR	0%	63%	routine

Spine	
Cord compression	100%
Unstable trauma	88%
Epidural abscess	88%
Epidural hematoma	75%

Head & Neck
All <50% agreement
Orbits for papilledema
Orbits for optic neuritis
Tumor with worsening symptoms
Post-op complications

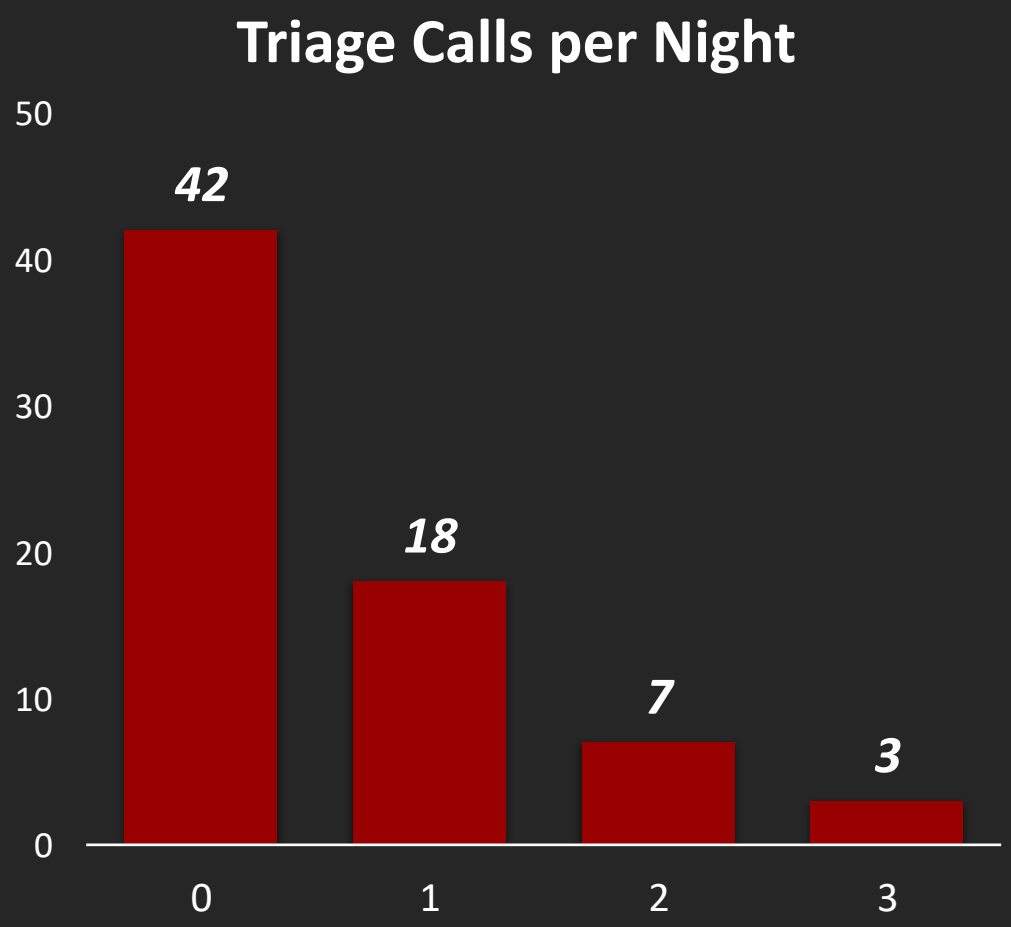
Triage Guidance:

Do, Defer, Divert

DO = Requested MR meets guidelines and is approved by triage
DIVERT = CT is more appropriate
DEFER = MR is appropriate but not urgent, schedule for day shift

Clinical Indication		Triage*	Protocol
Clinical concern for stroke, intracranial pressure/mass, headache with red flags		**DO**	Rapid brain (rMR)
Fast brain exclusions	• Patient < 7 years old or unable to cooperate • Reconsider for braces**	**DIVERT**	NECT Brain
Hemorrhage, trauma, nonaccidental trauma, seizure, meningitis		**DIVERT**	NECT
Empyema, abscess, cerebritis		**DIVERT**	Contrast-enhanced CT
Emergent brain abnormality identified on other imaging		**DO**	Routine brain MR
Cord compression		**DO**	Routine spine MR
Unstable spine injury***		**DO**	Trauma spine MR
Intra-op request from neurosurgery		**DO**	As ordered
Case urgent but not emergent		**DEFER**	If no day slots within 8 hours of order, can schedule at 5:30 am

Nightrad Impact



Triage time:

- **10 min (2 – 40)**

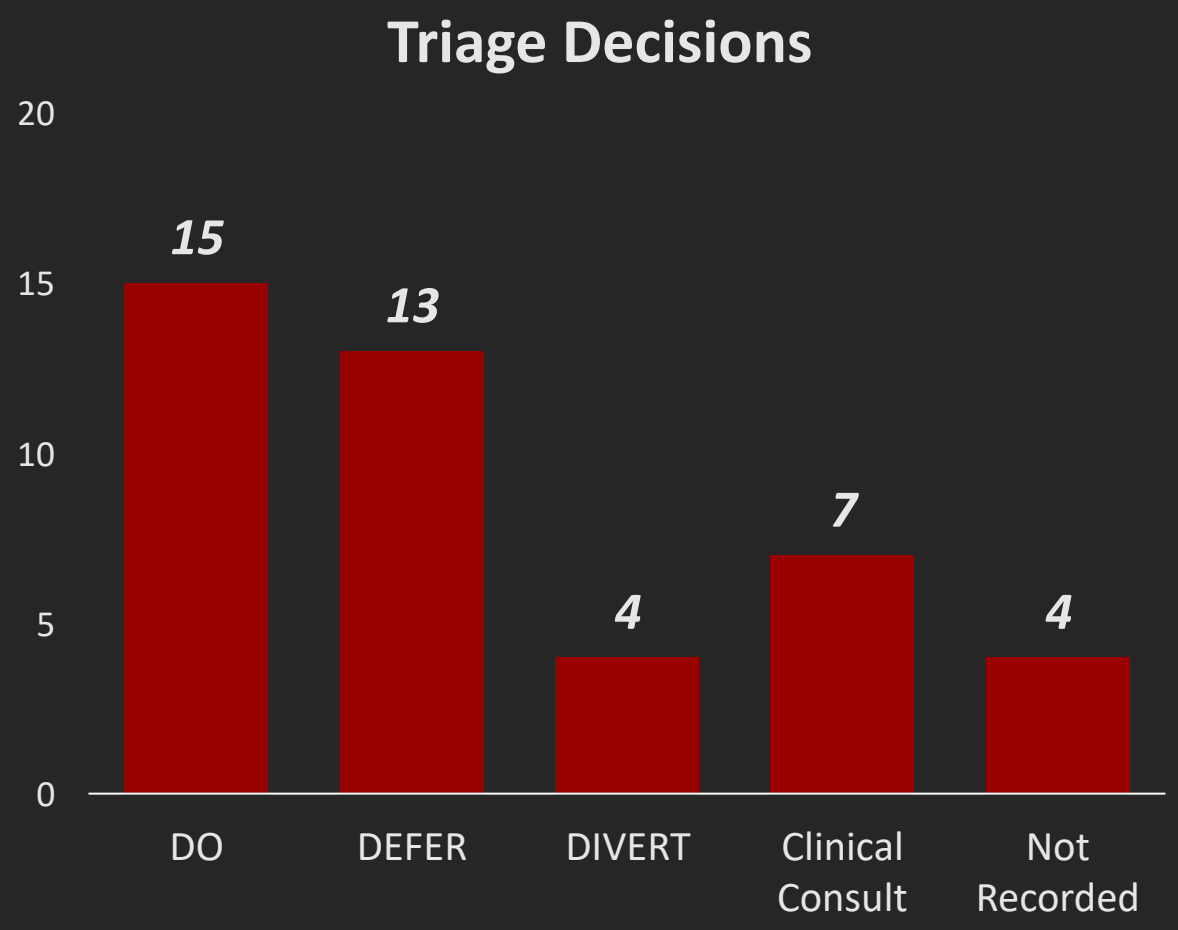
Difficulty, medical knowledge:

- **2 (1/10 – 7/10)**

Difficulty, psychological burden:

- **2 (1/10 – 7/10)**

Neurorad Impact



Prevent waking (Defer, Divert, Consult):

- N = 24

Decreased calls (Do):

- N = 15

Neurorad agreement:

- 66%

Modifications

- Provide ophthalmological imaging guidance
- rMR for headache only with “red flag” symptoms
- Publicize triage guidance

Conclusions

- Overnight triage can decrease neuroradiologist overnight work
  - Decrease times woken
  - Decrease number of calls
- Pediatric body radiologists can perform neuro MR triage
  - Limited burden for body radiologists
  - Acceptable agreement with neuroradiogists
- Guideline for clinicians may decrease low-yield requests

Thank you

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