

State of Artificial Intelligence in Pediatric Neurosurgery: A Systematic Review

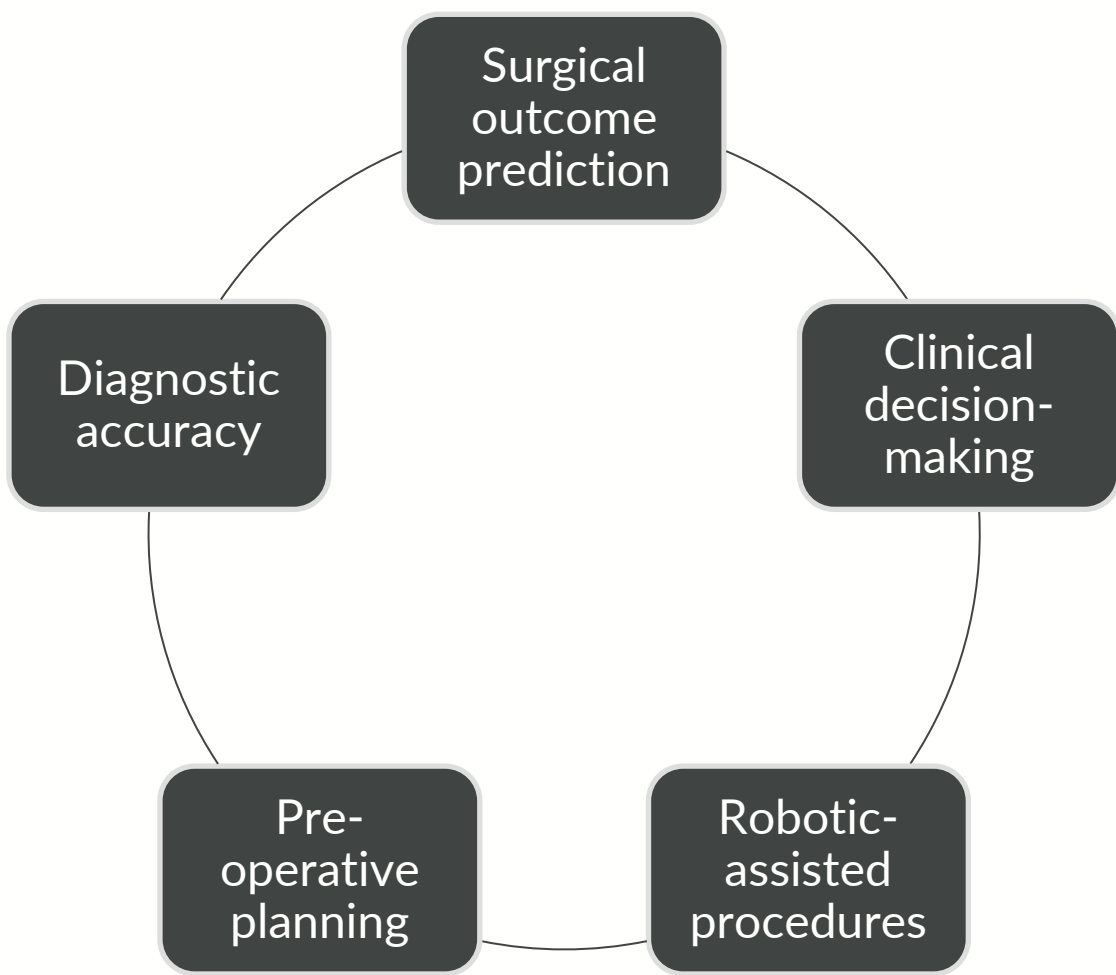
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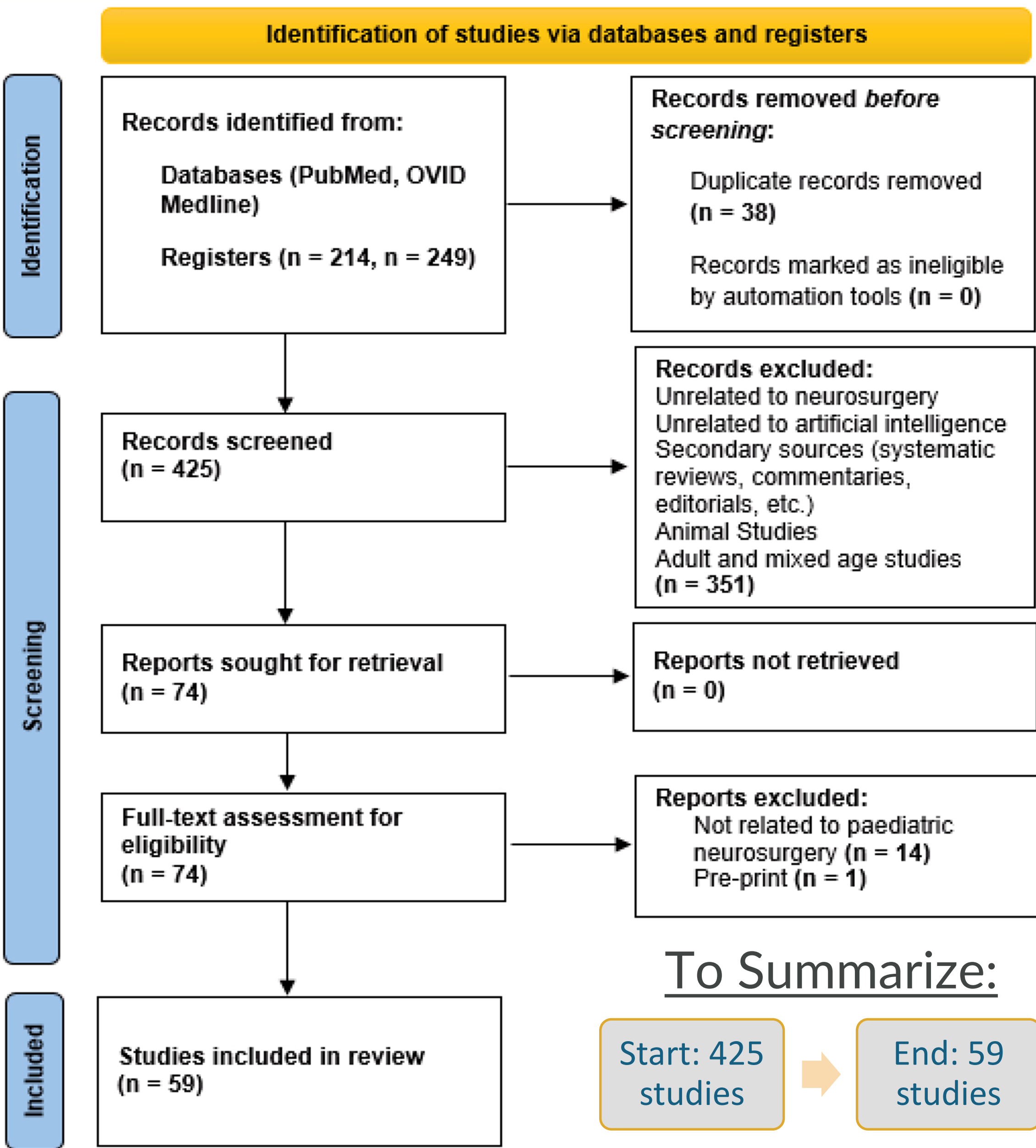


Introduction

- AI in neurosurgery has expanded over the past decade
- Pediatric neurosurgery remains underrepresented in AI research
- Aim of this review: Summarize current literature on AI in pediatric neurosurgery and highlight areas for future investigation



Methods



To Summarize:

Start: 425 studies → End: 59 studies

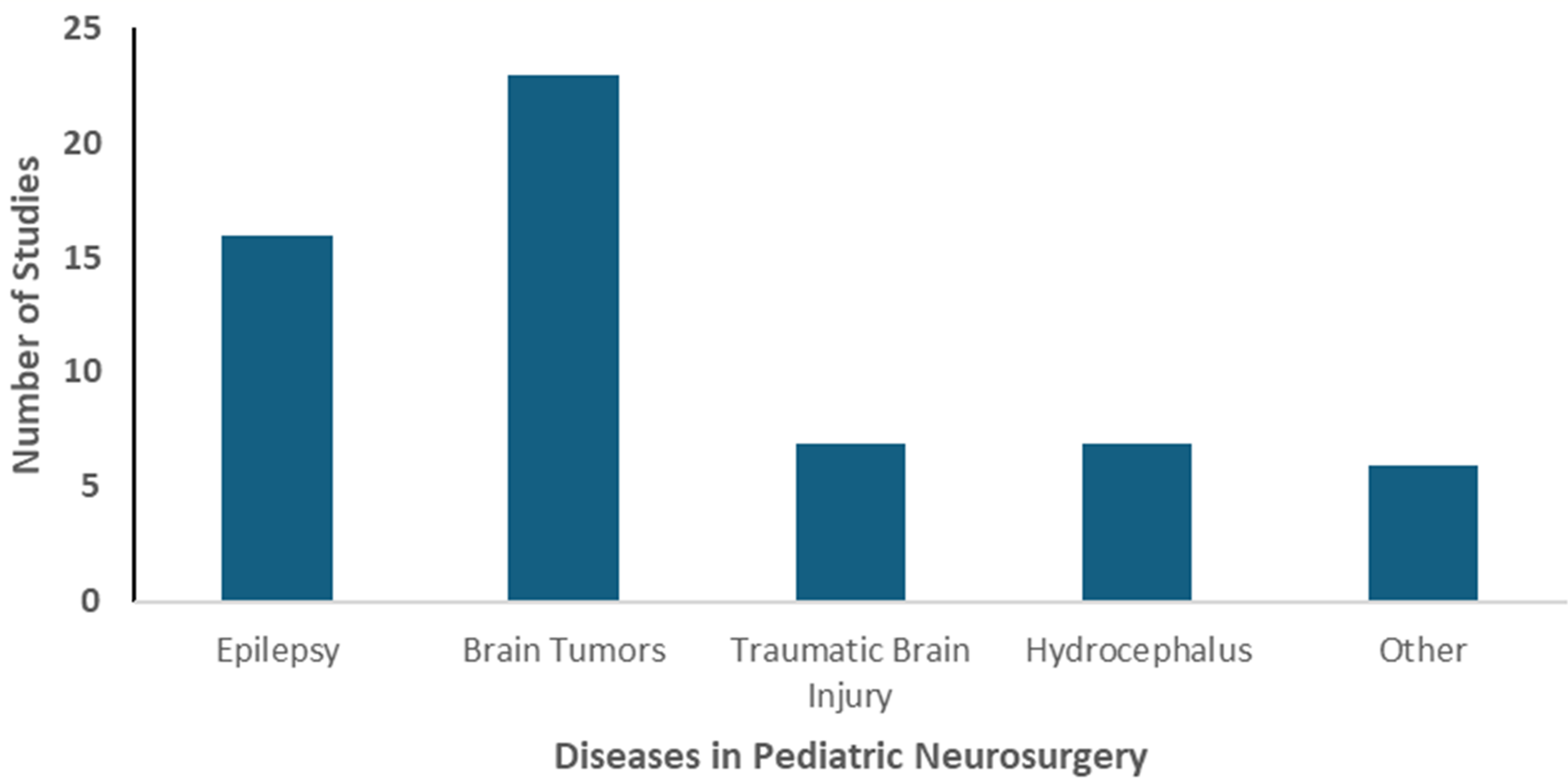
Results

Most Studied Conditions:

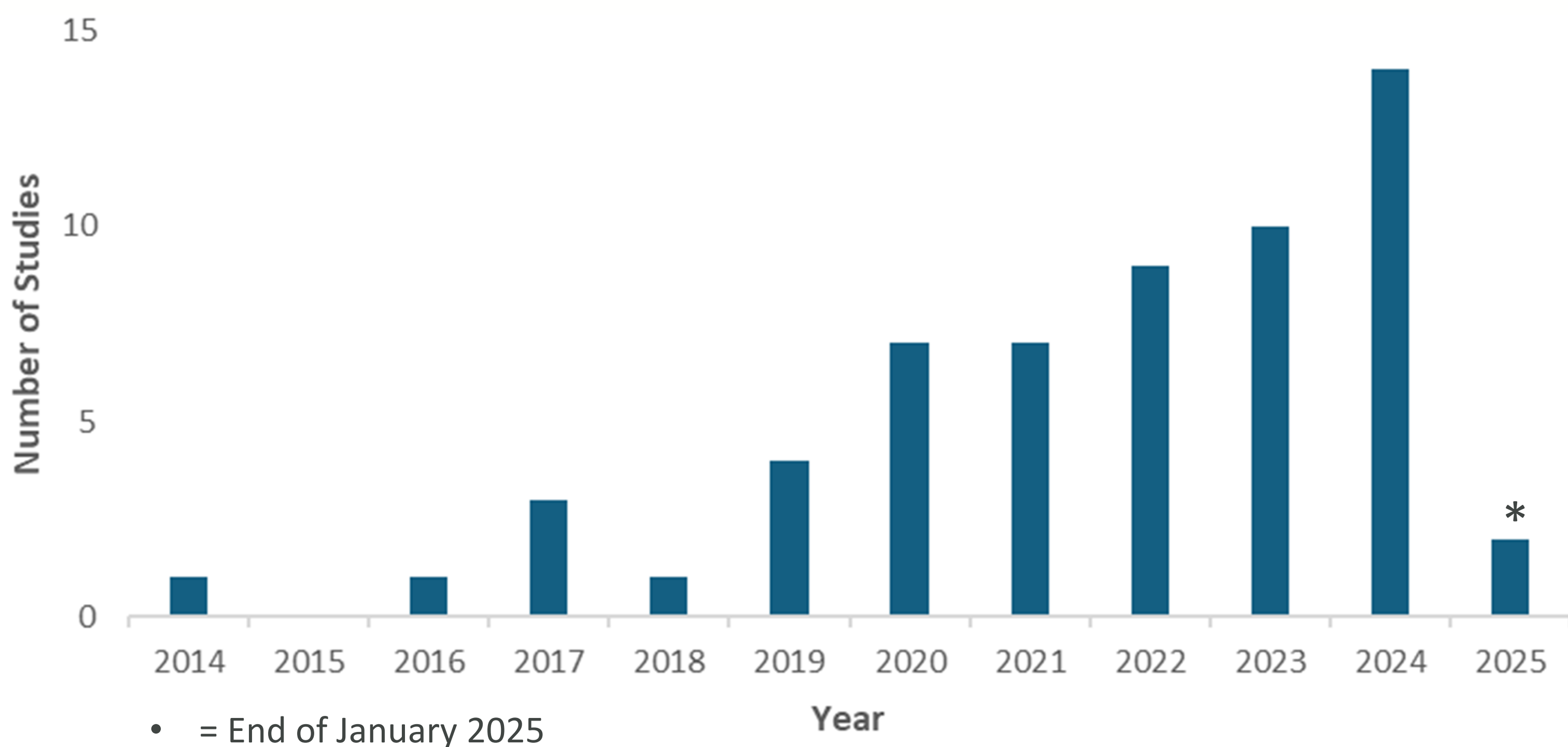
- Pediatric brain tumors – 23 studies (38.98%)
- Epilepsy – 16 studies (27.12%)
- Hydrocephalus – 7 studies (11.86%)
- Traumatic brain injury – 7 studies (11.86%)

Underrepresented Areas:

- Pediatric spine surgery
- Pediatric cerebrovascular surgery



Slow Growing Interest in the Literature



Discussion

Area of Concern:	Future Directions:
Intraoperative AI assistance/Surgical planning	Evaluation of adult neurosurgery AI intraoperative robotics and real-time feedback in the pediatric population
Educational Uses	AR/VR models for teaching, analysis of surgical videos, AI studying tools for board examinations
Big Data	Investment into large global and national databases of pediatric neurosurgical diseases
Testing in real clinical environments	Prospective validation of ML models and comparison to current standards

Conclusion

- Common limitation: Small sample sizes across studies.
- Call for action:
 - Develop larger, more diverse datasets
 - Conduct prospective studies to validate AI models
 - Establish standardized guidelines to ensure transparency and clinical relevance
- Goal: Enhance AI-driven outcome prediction and clinical decision-making in pediatric neurosurgery.