



Background

- Acute care providers make challenging decisions on whether urgent ophthalmology consultation is warranted in suspected non-accidental trauma (NAT) and can result in:
 - Delay of care
 - Risks due to COVID19 pandemic^{1,2}
- Upstate Medical University's protocol suggests ophthalmology consultation for:
 - Any infant < 12 months old
 - A child 1-5 years old if facial bruising and/or suspicion of eye or head injury
- These guidelines lack specific evidence

Objectives

- To determine if non-ocular imaging and examination findings predict the presence of retinal hemorrhage (RH) and correlate to visual outcomes

Methods

- Hospital- and clinic-based retrospective cross-sectional and cohort study
- Children evaluated for NAT over 9 years at a level 1 trauma and tertiary referral center: Upstate Medical University, Syracuse, NY
- Chart review of imaging, physical exam, and initial and follow-up ocular findings

Figure 1: Case selection

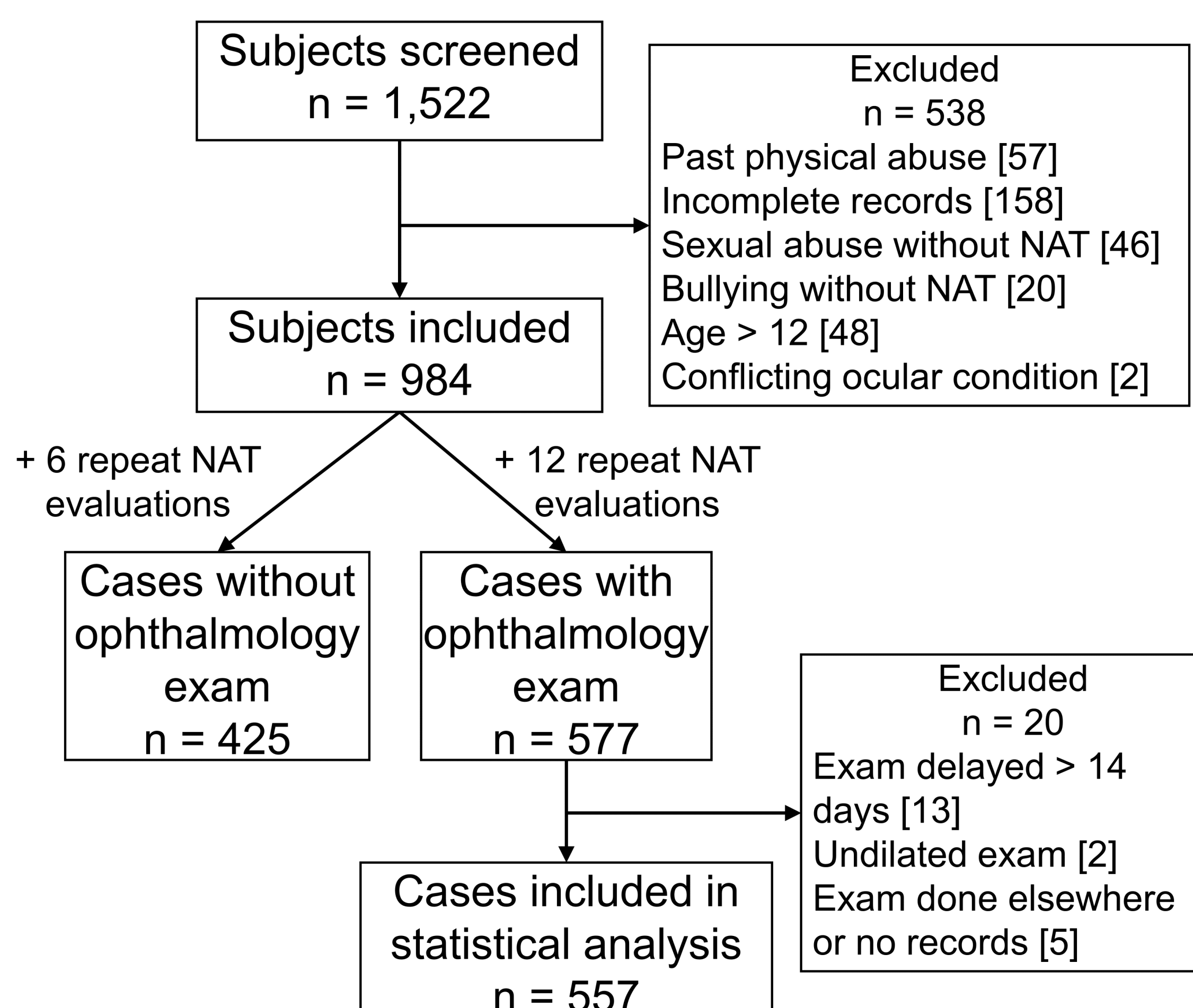
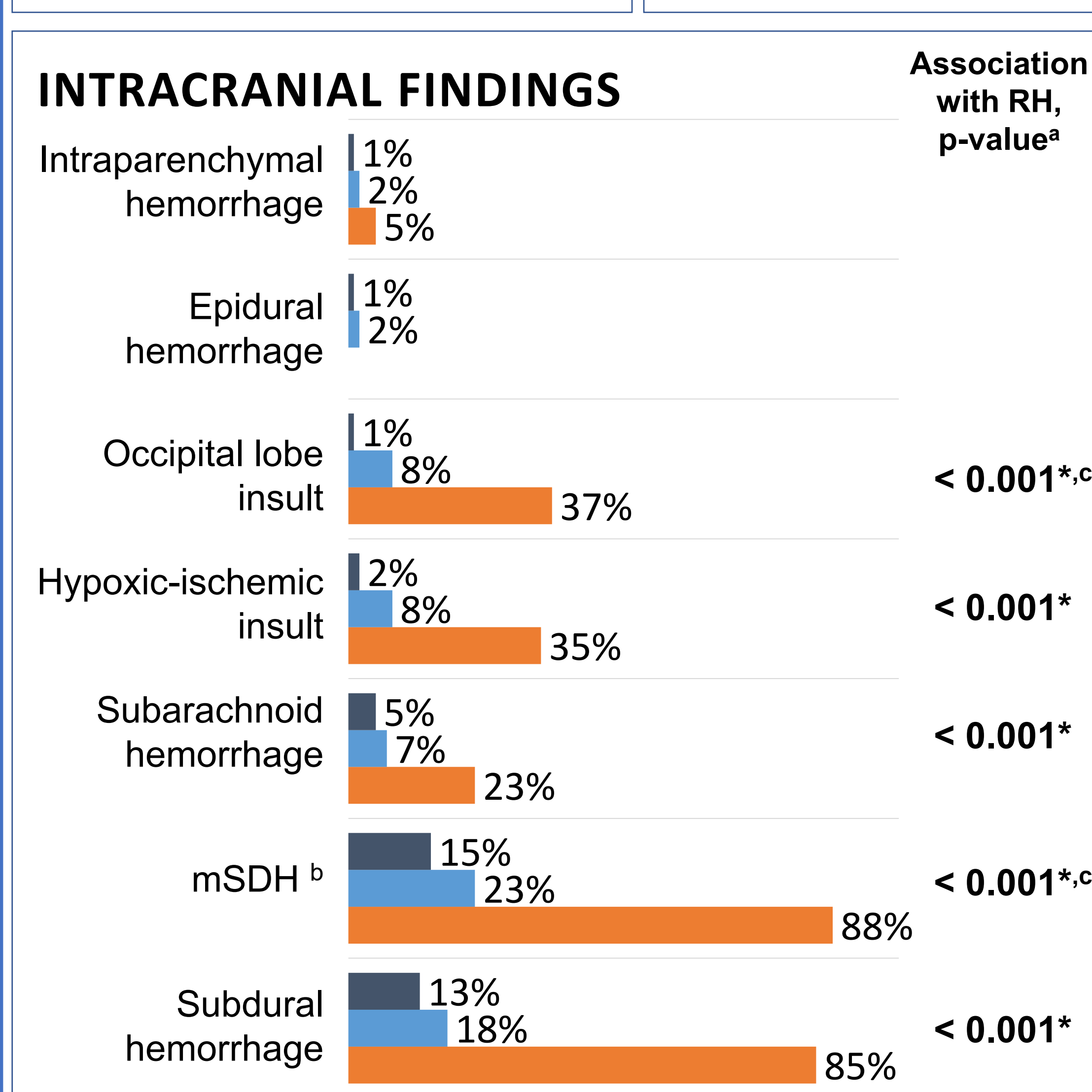
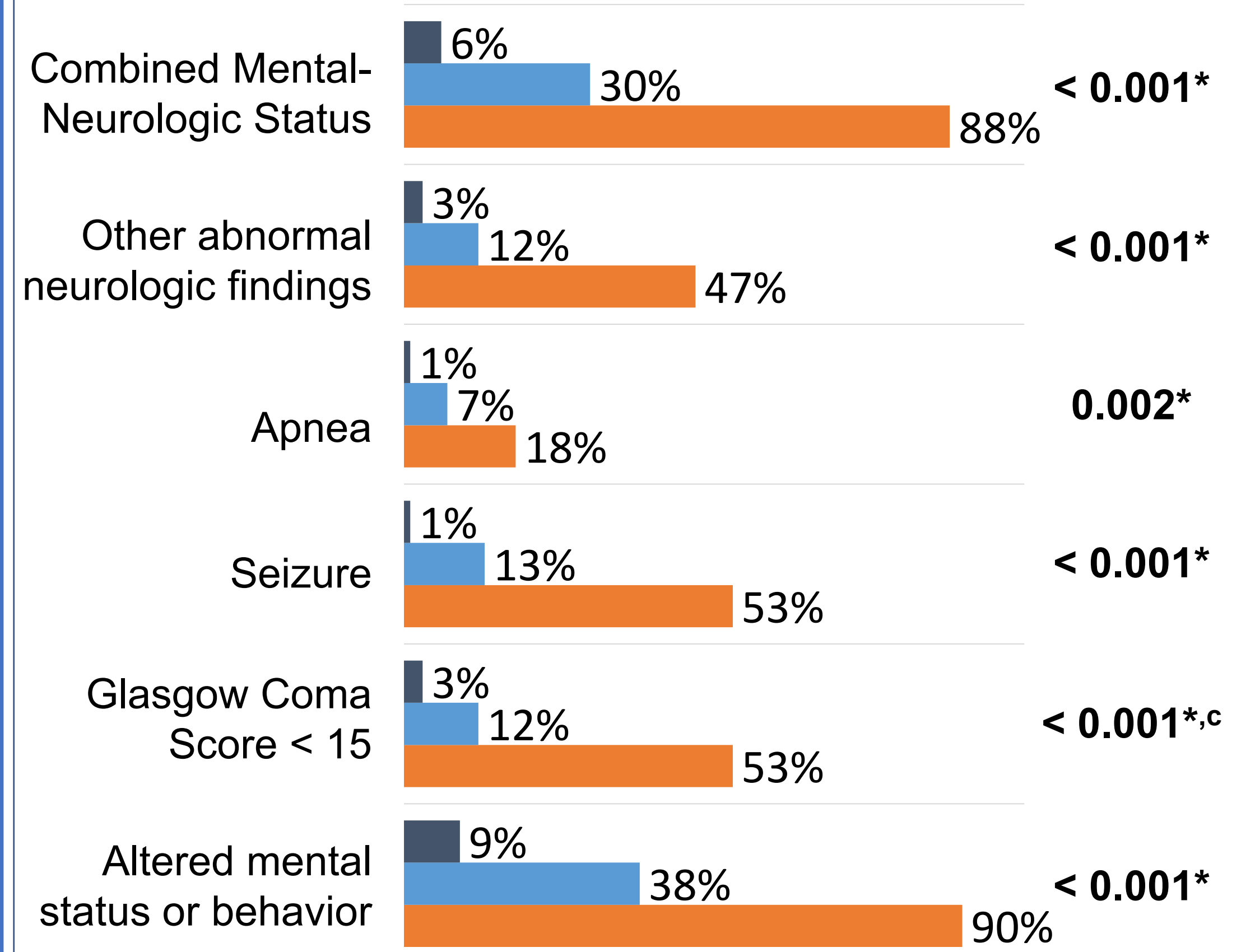


Figure 2: Prevalence of exam findings in patients with suspected NAT and association with RH by univariate analysis



NEUROLOGIC FINDINGS



^a p-values achieved from univariate Pearson or Fisher chi-square test
^b Subdural hemorrhage and/or undistinguishable extra-axial hemorrhage
^c This variable was also found to be statistically significant by multivariate logistic regression (Table 2)

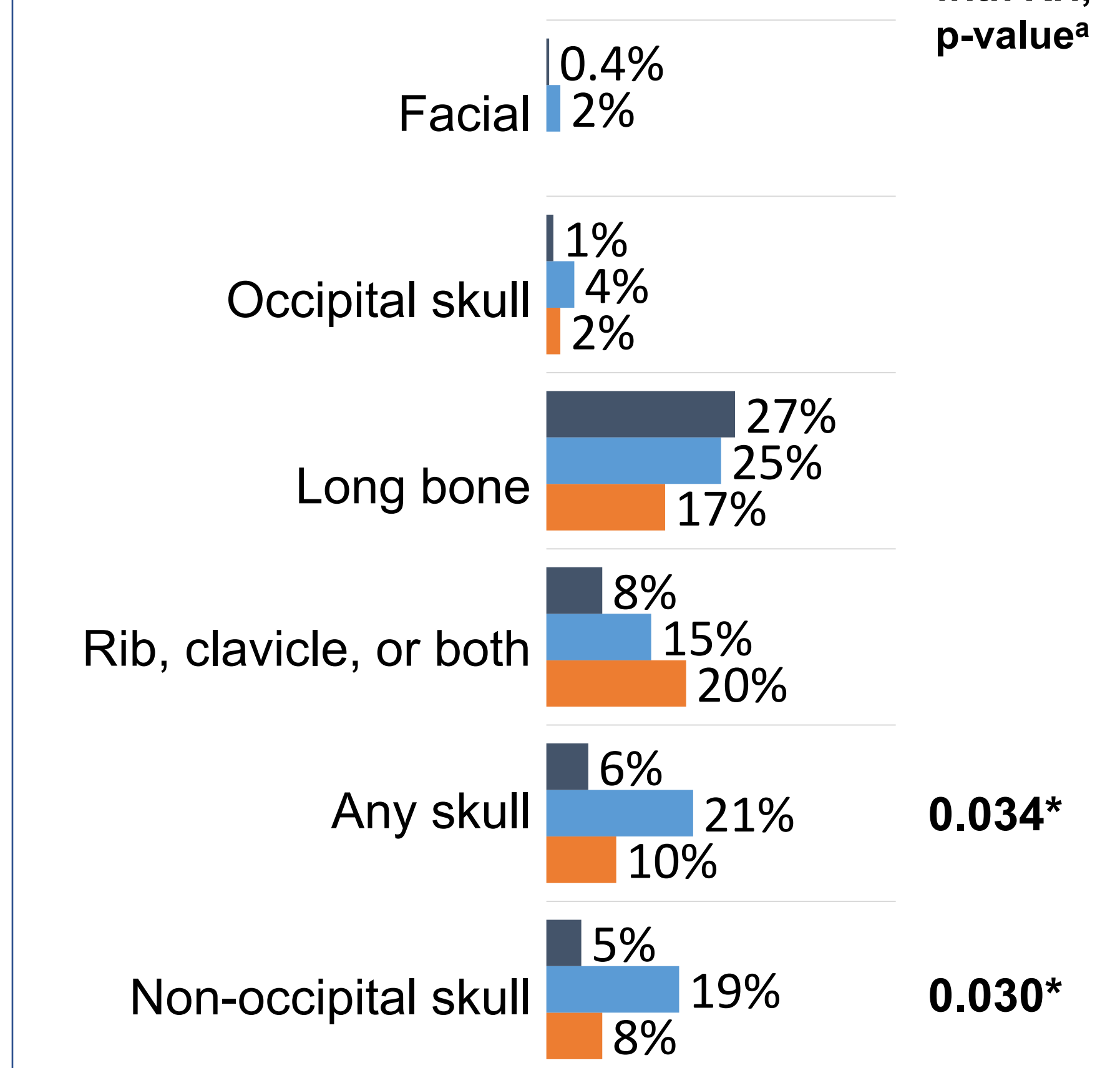
Table 1: Non-ocular exam variables associated with RH by multivariate logistic regression

Variable	Risk for RH, OR (95% CI)
mSDH	16.2 (5.1-51.3)
Occipital lobe involvement	6.2 (1.8-21.6)
Glasgow Coma Score < 15	5.8 (2.0-17.4)

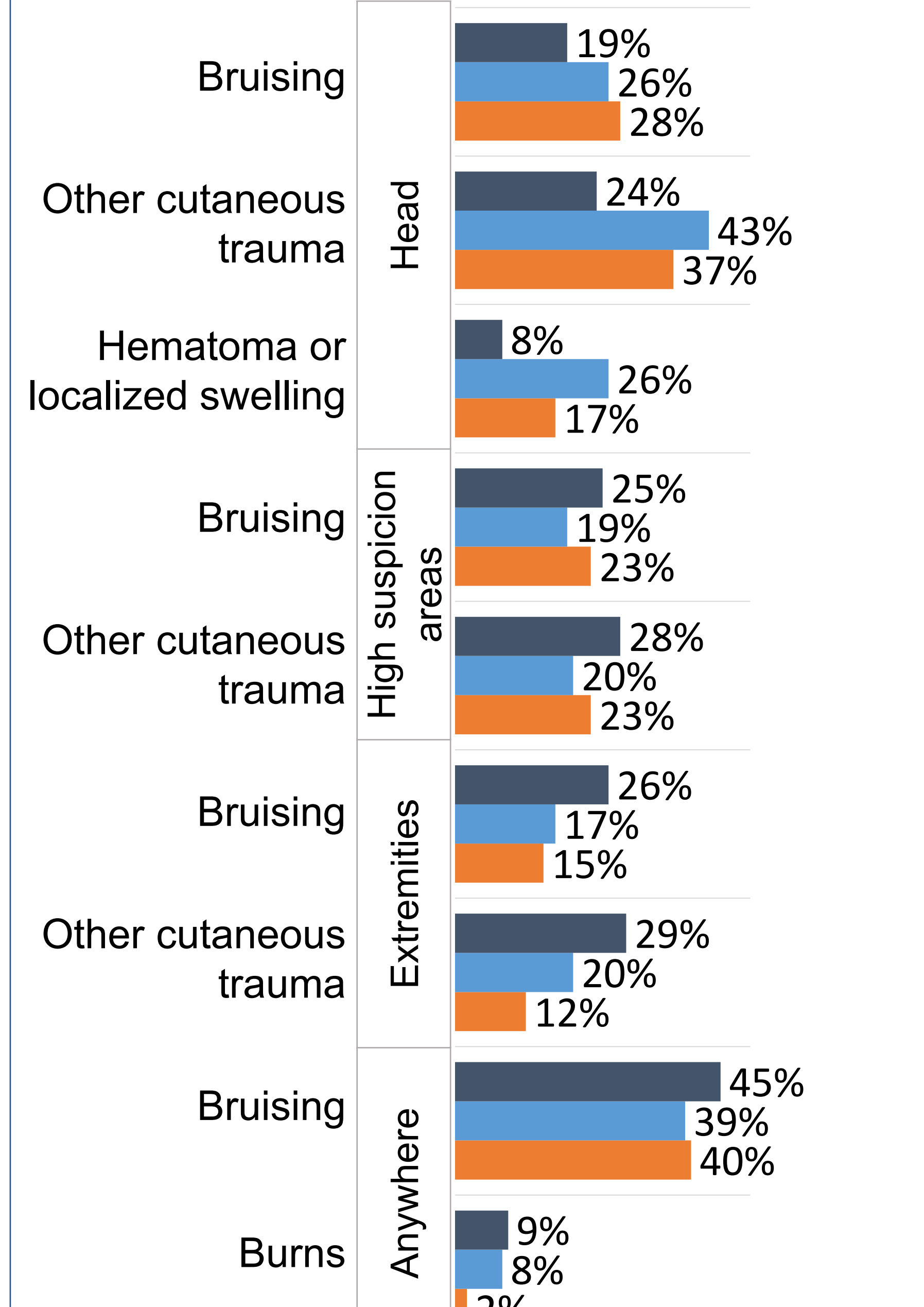
References

- Hoeflerlin C, Hosseini H. Review of clinical and operative recommendations for ophthalmology practices during the COVID-19 pandemic. *SN Compr Clin Med.* 2021;1-6.
- Yashiro S, Ueta T, Kutsuna S, Okamoto T, Nagahara M, Ohmagari N. Using flowchart for ophthalmic consultations in hospitalized patients with COVID-19. *Glob Health Med.* 2020 Dec 31;2(6):395-397.

BONE FRACTURES



SKIN FINDINGS



Results

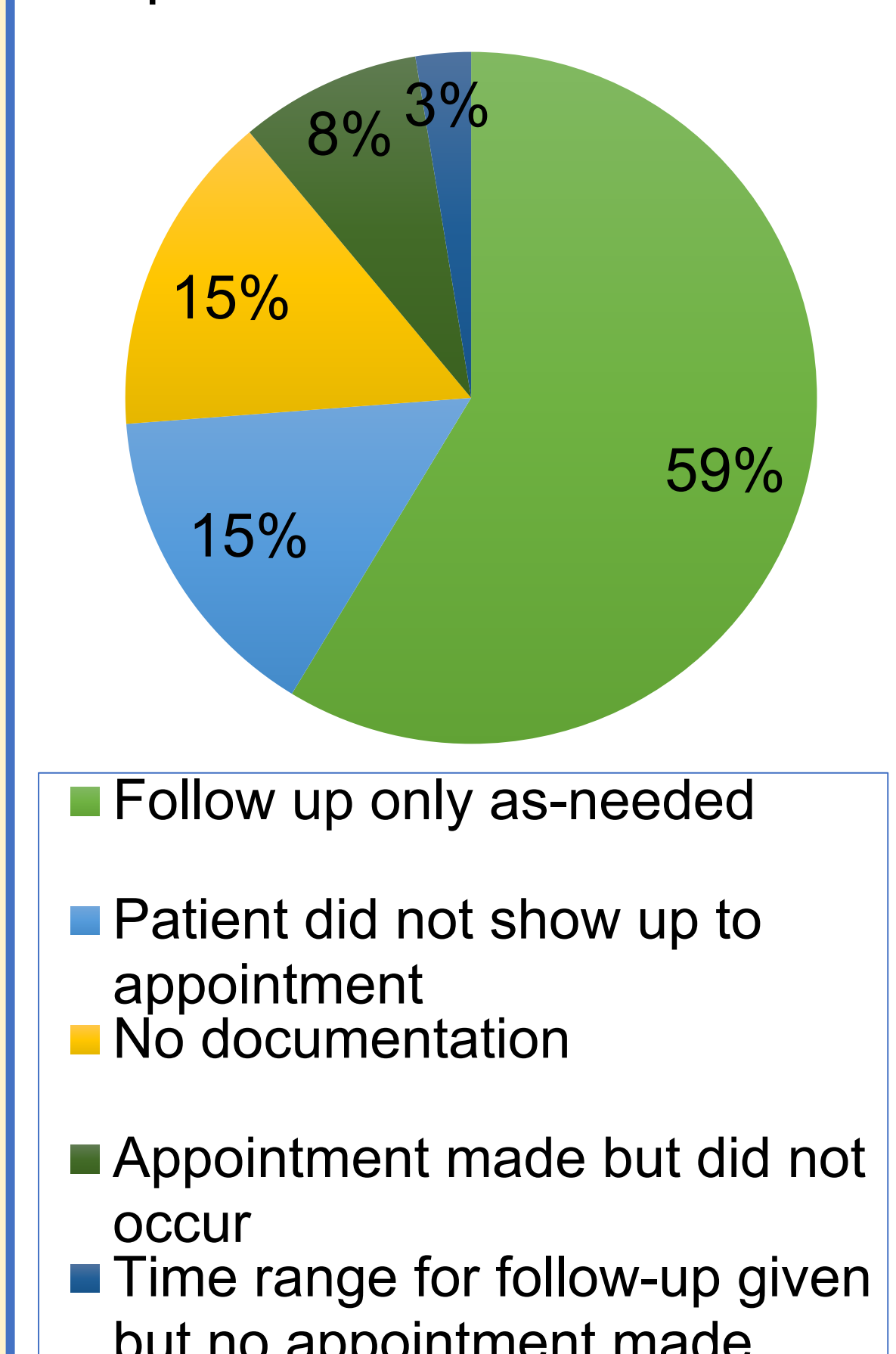
- 557 cases with ophthalmology evaluation (wOphth), Figure 1
- 425 cases without ophthalmology evaluation (nOphth), Figure 1
- 60 cases (11%) with RH in the wOphth group
- Factors associated with RH by multivariate and logistic regression are shown in Figure 2 and Table 1, respectively
- Visual outcomes and follow-up for patients with the three predictive variables from Table 1 is shown in Table 2
- 276 (50%) of wOphth cases had ophthalmology follow-up
- 271 surviving wOphth cases did not (Figure 3). None had RH. 10 had an external ocular finding such as subconjunctival hemorrhage, 5 of which were told they needed to follow up.

Table 2: Distribution of patients with risk factors for RH and visual outcomes

Number of Risk Factors Present	3	2	1	None
nOphth, Number				
Total	1 ^a	6 ^b	9	409
wOphth, Number (%)				
Total on initial examination	13	43	87	414
With RH	11 (85)	28 (65)	18 (21)	3 (0.7)
Survivors with follow-up past 2 weeks at our clinic	10 (91)	26 (70)	34 (41)	79 (19)
On follow-up examination				
With cortical visual field defects or blindness	4 (40)	1 (4)	1 (3)	0
With eye misalignment and/or requiring patching ^c	2 (20)	4 (15)	4 (12)	3 (4)
Requiring ophthalmic surgery	0	1 (4)	0	0

^a RH in left eye detected by primary team via undilated ophthalmoscopic exam prior to patient death
^b 5 out of 6 patients died before ophthalmology exam could be completed
^c p = 0.03 for association with the 3 risk factors

Figure 3: Reasons for lack of follow-up in surviving wOphth cases



Conclusions

- Three findings associated with RH in NAT should trigger prompt ophthalmology consultation by emergency or trauma providers: mSDH, Glasgow Coma Score < 15, and occipital lobe insult
- These risk factors also suggest increased risk of poor visual outcomes, and warrant follow-up with ophthalmology
- Cutaneous trauma or bone fractures do not necessitate immediate ophthalmologic evaluation
- Based on our criteria, 16 at-risk nOphth patients over the last 9 years should have had ophthalmology evaluation
- Some patients with external ocular findings were lost to follow-up, suggesting the need for diligence of the entire care team

