



Triaging Pregnancy of Unknown Location: Comparison of NICE ratios with M6NP model.

Saroj Dalmia¹, Suzie Peatman²

¹Darlington Memorial Hospital, ²James Cook University Hospital



Introduction: Several management protocols have been put forward to achieve reliable risk stratification in PUL . The hCG ratio is defined as the 48 hr hCG divided by the initial (0-hr)hCG. The M6 Model is a logistic regression model based on the hCG ratio and the initial serum hCG and progesterone levels. M6NP does not use the initial progesterone level as a variable.

Objective

To study the performance of two protocols based on serial human chorionic gonadotropin (hCG) measurements when triaging pregnancies of unknown location (PULs) as low or high risk of being an ectopic pregnancy (EP).

Predictors	Enter Values
Initial serum hCG (IU/L)	1234
48 hour serum hCG (IU/L)	1334
Did the patient receive progesterone treatment?	no
Initial serum progesterone (nmol/L) optional	

calculate

Clear

M6NP

NICE

NICE ratio- serum hcg at 48 h/hcg at presentation

Low risk - 50% for declining hCG levels and 63% for rising hCG levels

High risk – if <50% fall or <63% rise

– ln ratio : 0.5 -1.63

Methodology

This was a retrospective comparative study of two different HCG-based protocols (NICE vs M6NP) classifying PULs as low or high risk of being an EP over a period of 1 year (Jan 2018-Jan 2019)

All women presenting to the early pregnancy unit at the James Cook University Hospital with an initial transvaginal ultrasonography finding of PUL and subsequent serial HCG were identified during this time period. The rate of change of serum HCG over 48 hrs was calculated for each patient and was subjected to NICE ratios and a logistic regression model M6NP for outcome prediction. The first protocol used hCG level cut-offs published by NICE, 50% for declining hCG levels and 63% for rising hCG levels for low risk of ectopic pregnancy, otherwise high risk. The M6NP model used a cut-off of ≥5% risk to classify PUL as high risk of ectopic pregnancy, otherwise low risk.

Each PUL was subsequently classified as either low-risk (failed PUL/Intrauterine pregnancy IUP) or high-risk (EP) using both models. The diagnostic performance of the models was compared.

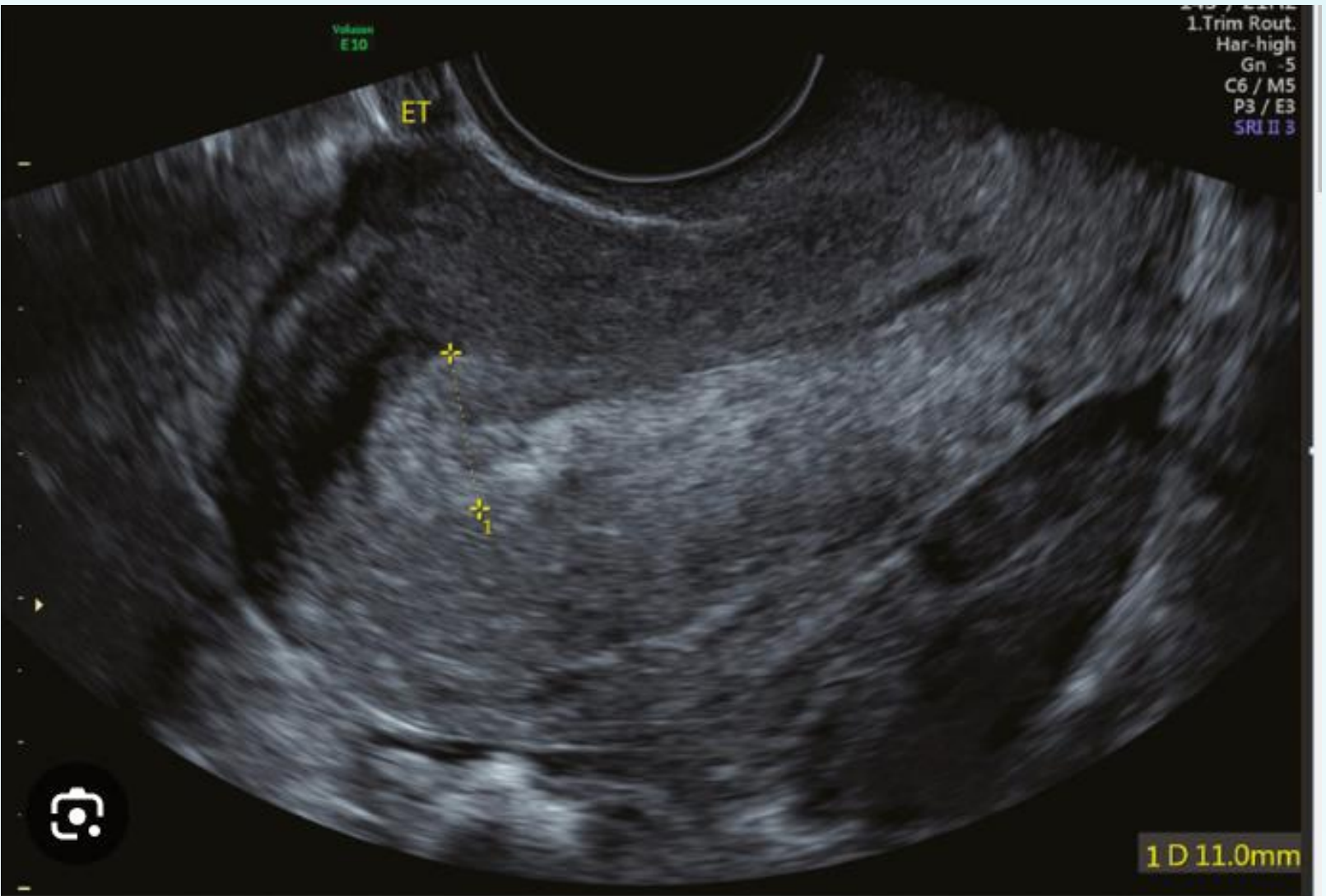
PREDICTED PROBABILITIES AND CLASSIFICATION

Risk predictions	Interpretation
Risk of ectopic pregnancy	43.3 %
Risk of failed PUL	21.8 %
Risk of intrauterine pregnancy	34.8 %

Patient in high risk group for ectopic pregnancy

PUL – M6 MODEL

Results



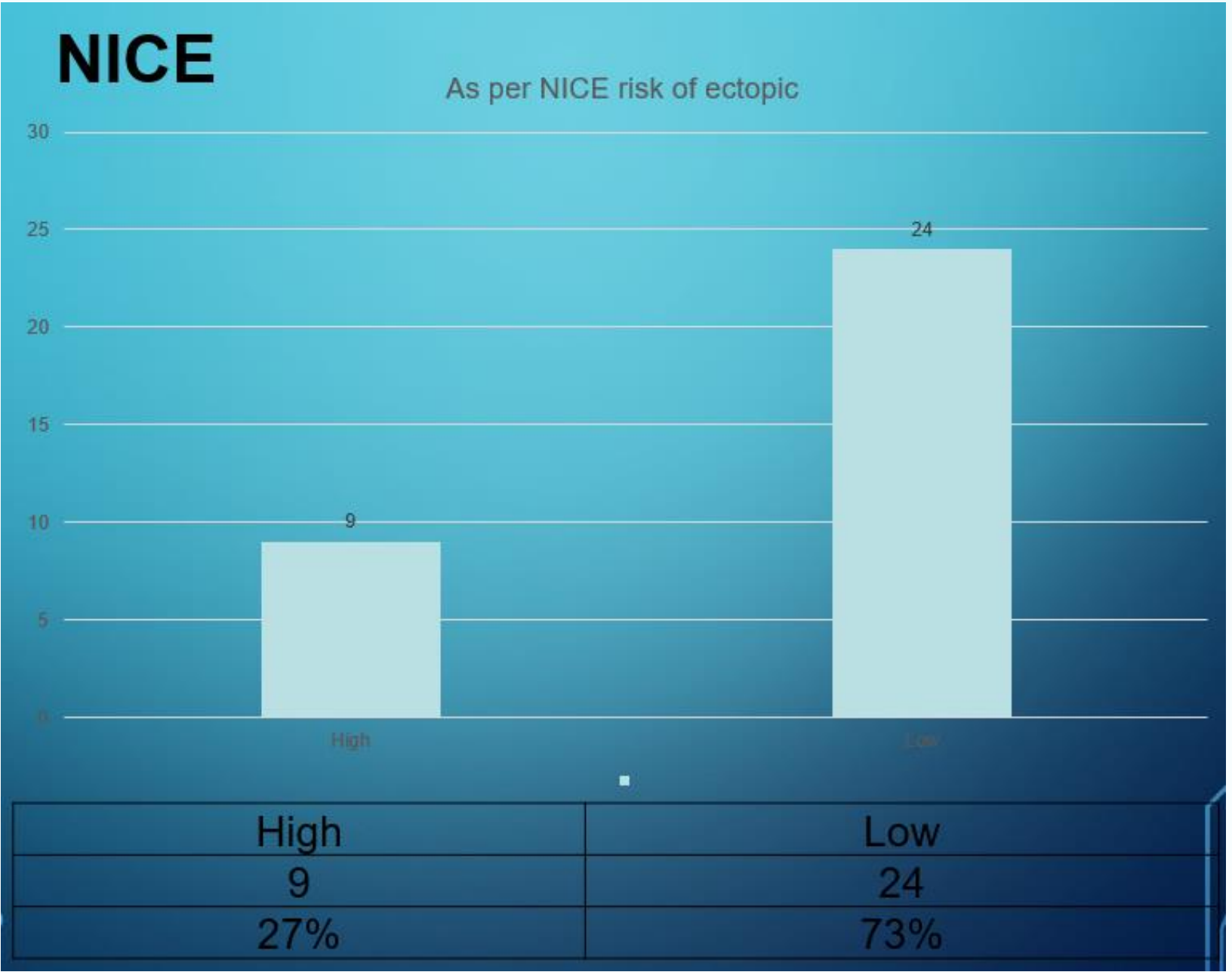
Sample size – 33

Age Range- 20-37 yrs (Mean 28, Median 28)

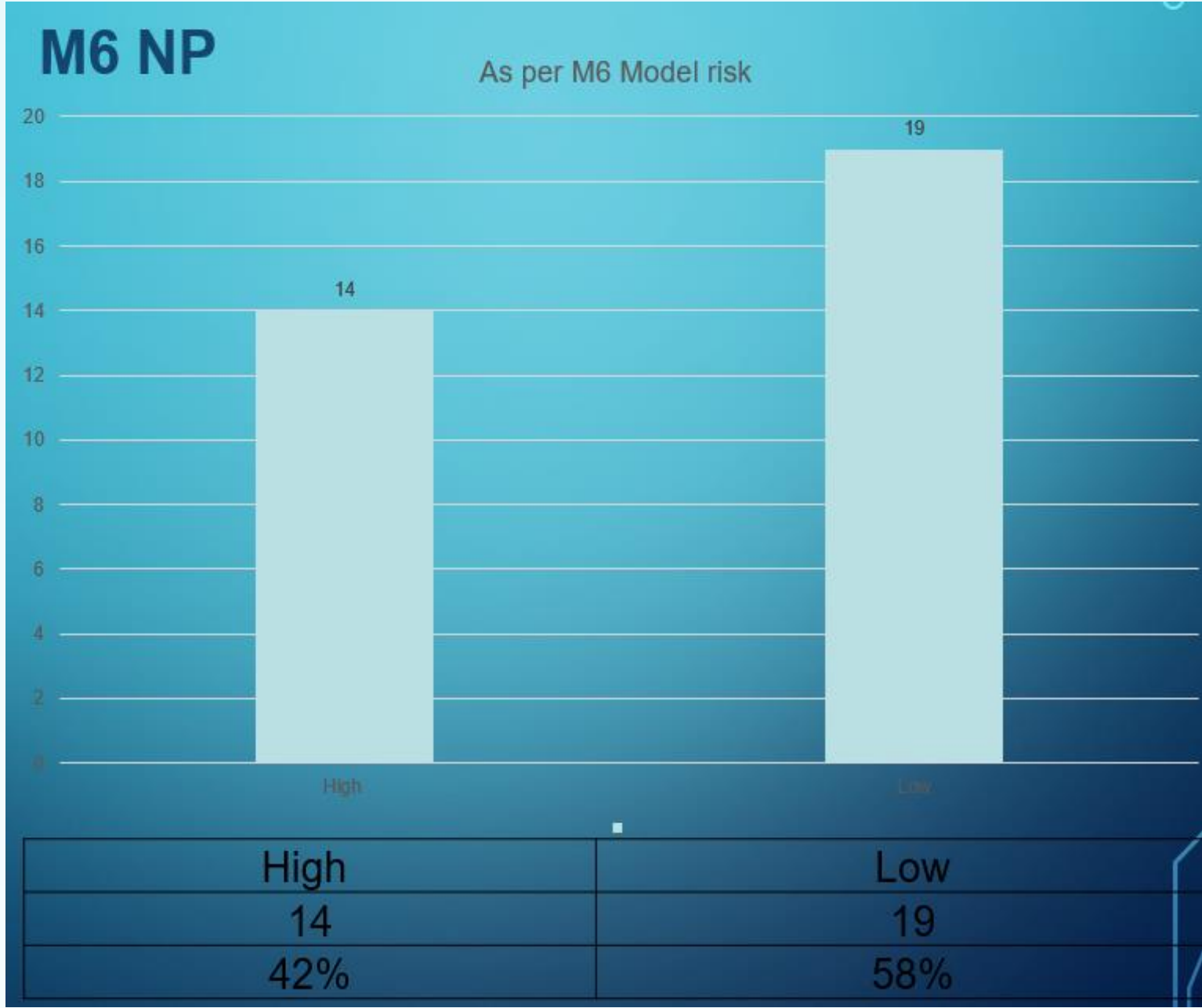
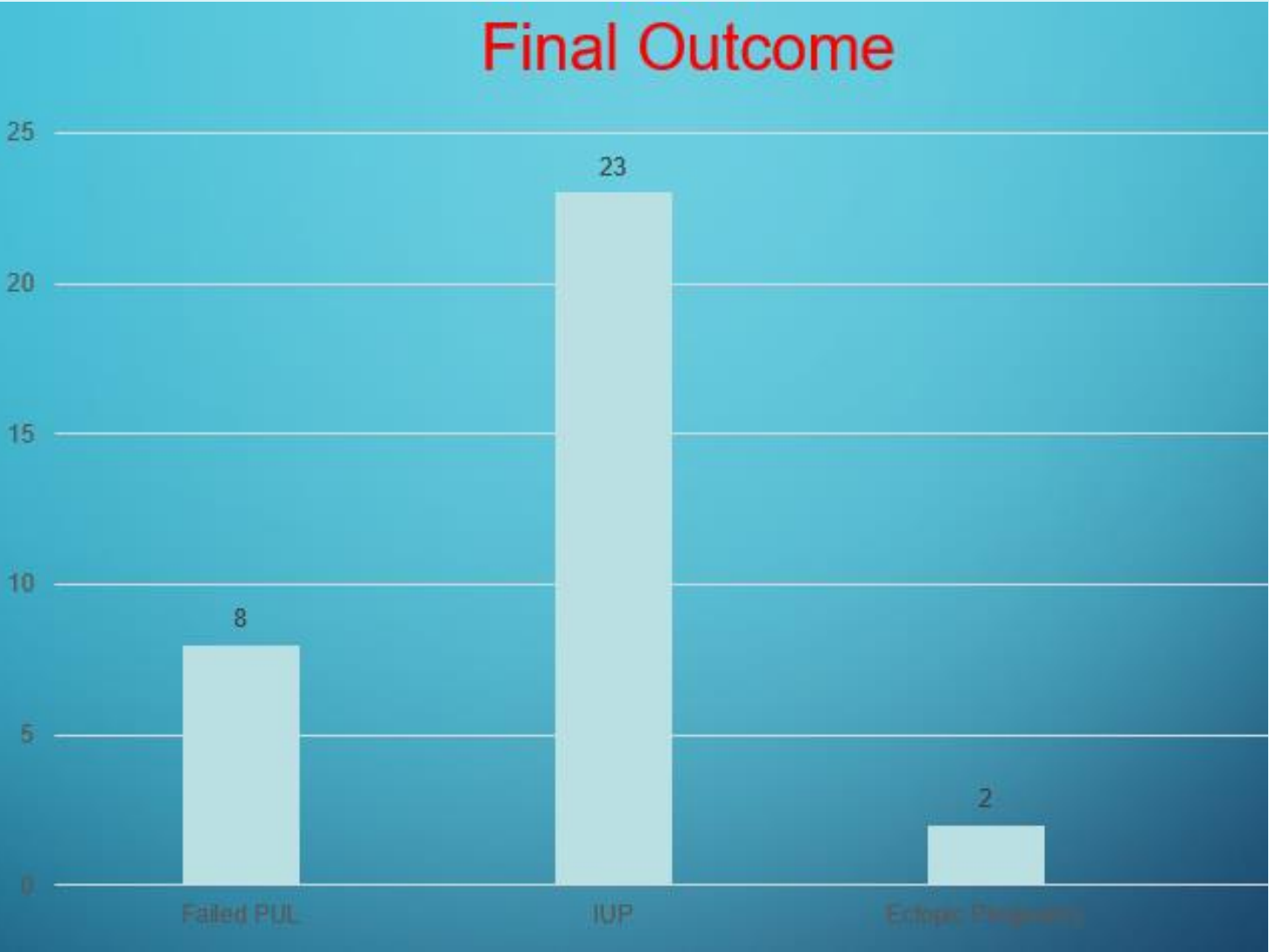
Time interval between serial Bhcg 40-51 hrs (Mean – 47.6 hours, Median 48 hours)

Initial b-hCG range 64- 5651 (Mean 1554, Median 1202)

	As per M6 Model	
As per NICE	High	Low
High	9 (100 %)	
Low	5 (20.83%)	19 (79.17%)



	NICE	M6 NP
Sensitivity	100%	100%
Specificity	77%	61%
NPV	100%	100%
PPV	22%	14%
False positive	23%	39%
Classified as low risk	73%	57%



Results

We identified 33 women with a PUL on initial TVS. Of these, 23 (70%) had a final diagnosis of IUP, 8 (24%) failed PUL, and 2 (8%) were ectopic pregnancies. NICE ratios classified 73% of PULs as low risk, while M6NP classified 58% as low risk. The sensitivity and NPV for both protocols were 100%. NICE ratios classified 27% of PULs as high risk, while M6NP classified 42% as high risk. The specificity was 77% and 61%, and the PPV was 22% and 14% for NICE ratios and M6NP, respectively.

Conclusion

The performance of M6NP in our study was similar to the other studies in the literature. We did not find any studies which compared NICE ratios to M6NP. In our study, both the M6NP model and the NICE hCG ratios classified PULs correctly as low risk in the selected population. However, fewer low-risk PULs are misclassified as high-risk by NICE ratios compared to M6NP. However, the retrospective design and small numbers were limitations of this study. Hence, these findings ought to be clarified in further trials.

References

- Fistouris J, Bergh C, Strandell A. Classification of pregnancies of unknown location according to four different hCG-based protocols. Hum Reprod. 2016 Oct;31(10):2203-11. doi: 10.1093/humrep/dew202. Epub 2016 Aug 31. PMID: 27580995.
- Bobdiwala S, Christodoulou E, Farren J et al Triaging women with pregnancy of unknown location using two-step protocol including M6 model: clinical implementation study. Ultrasound Obstet Gynecol. 2020 Jan;55(1):105-114. doi: 10.1002/uog.20420. PMID: 31385381.
- Ooi S, De Vries B, Ludlow J. How do the M4 and M6 models perform in an Australian pregnancy of unknown location population? Aust N Z J Obstet Gynaecol. 2021 Feb;61(1):100-105. doi: 10.1111/ajo.13252. Epub 2020 Sep 28. PMID: 32985693.
- Bobdiwala S, Christodoulou E, Farren J et al. Triaging women with pregnancy of unknown location using two-step protocol including M6 model: clinical implementation study. Ultrasound Obstet Gynecol. 2020 Jan;55(1):105-114. doi: 10.1002/uog.20420. PMID: 31385381.