Original Research Paper

Anaesthesiology

VALIDATION AND REFINEMENT OF THE ADULT DIFFICULT INTRAVENOUS ACCESS SCORE: A CLINICAL PREDICTION RULE FOR IDENTIFYING ADULTS WITH DIFFICULT INTRAVENOUS ACCESS

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KEYWORDS :

INTRODUCTION

Peripheral intravenous (iv) cannulation, most common invasive procedure, not easily obtained in all.
- Multiple unsuccessful attempts associated with risks- nerve damage, paresthesia, hematoma, arterial puncture.
- So necessary to have a predictive scale which identifies high probability of a difficult iv access.
- Adult-Difficult Intravenous Access (A-DIVA) score, proportionally weighted five-variable.

TABLE 5. Risk Factors, Definition, and the Additive Score

Risk Factor	Definition	Additive Risk Score
Palpable appearance	Is it impossible to identify the target vein by palpating the upper extremity?	1
History of difficult intravenous access	Was it difficult to insert a peripheral intravenous catheter in the past?	1
Visual appearance	Is it impossible to identify the target vein by visualizing the upper extremity?	1
Unplanned indication for surgery	Is the patient at an emergency indication for surgery?	1
Diameter of the vein ≤ 2 millimeters	Does the target vein have a diameter of at most 2 millimeters?	1

- 0-1 low risk , 2-3 medium risk & >4 high risk
- Clinical rule, has been developed to predict failure of intravenous (IV) placement in adult.

AIM OF THE STUDY
- To externally validate A-DIVA scale
- To refine the predictors of A-DIVA scale

METHODOLOGY
Prospective cross-sectional, clinical observational study.

February 2019 to September 2019, MVJ Medical College Ethical committee approval and informed consent was taken.

500 subjects randomly selected

Inclusion criteria:
Aged >18 years irrespective of ASA grade undergoing peripheral IV placement before surgery

Exclusion criteria :
unresponsive patients and whose cannulation already gained in ward Socio- demographic profile sheet Clinical profile sheet A- DIVA scale The outcome of interest was defined as failure of cannulation on first attempt. Scoring of the vein done according to A-DIVA scale

Proposed refinement predictor variables :
age
skin shade
vein valves
tortuous vein
thrombosed vein
operator experience
site & side of cannulation.

STATISTICAL ANALYSIS
To compare patients regarding primary outcome, chi-square test and unpaired sample T-test were performed as appropriate
- Potential risk factors identified in a univariate logistic regression analysis
- Items with a $P < 0.001$ were considered as statistically significant with 95% confidence interval(CI).

RESULTS
- Mean age of patients was 42.55 years (SD= ± 15.06 yrs)
- 28%(140) subjects failed first IV attempt.
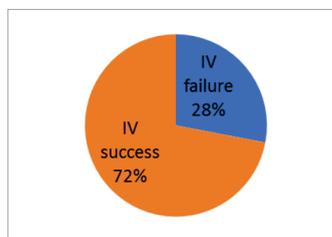
The original five-variable model tested statistically significant.
- Hence additive 5-variable A-DIVA scale is a reliable predictive rule that implies the probability to identify patients with a difficult iv access prospectively.

Parameter	IV success	IV failure	T/Chi square value	P value
Visual				
0	333	111	17.698	0.000*
1	27	29		
Palpable				
0	335	122	5.512	0.019*
1	23	18		
Diameter				
0	301	90	22.083	0.000*
1	59	50		
History				
0	337	108	27.924	0.000*
1	23	32		
Unplanned				
0	344	126	5.516	0.019*
1	16	14		
DIVA total score				
0	272	58	71.356	0.000*
1	55	39		
2	16	29		
3	9	14		
4	1	7		

- The scoring system was applied in 3 risk groups as they failed first attempt IV access-
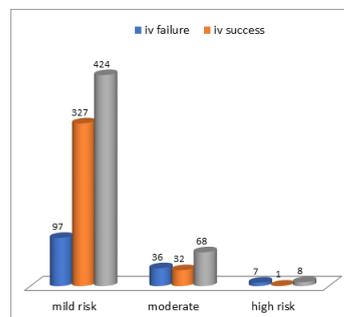
A- DIVA score	Risk grading (N)	IV failure (%)
0 or 1	Low risk (424)	97 (22 %)
2 or 3	Medium risk (68)	36 (53 %)
4 plus	High risk (8)	7 (87 %)

Addition variables predict failure of IV are:-

Variables	IV success	IV failure	t/ Chi square value	P- value
Tortous vein				
Yes	70	49	13.449	0.000*
No	290	91		
Phlebitis				
Yes	14	13	5.747	0.017*
No	346	127		
Valves				
+	68	86	85.584	0.000*
-	292	54		

DISCUSSION

- Difficult intravenous access is a frequently encountered clinical challenge, which has been subject of research in various previous publications.
- Reported success rates of first attempt peripheral IV cannulation varies from 98% to as low as 51%, whereas our study shows an 72% success rate.
- Failure to obtain a peripheral IV access can delay diagnosis and treatment, and may expose patients to risks associated with central venous cannulation.
- No scoring system will precisely predict the outcome for a patient. Though, risk stratification helps eliminating bias against patients at high-risk for difficult intravenous access and may reduce complications related to the procedure.
- Early recognition of patients at risk could help in applying alternative approaches, such as infrared(IR) assisted/ ultrasound guided IV catheter placement, to achieve a successful peripheral intravenous access.
- In general, we believe it would not improve efficacy nor be cost-efficient to apply IR/ USG devices in all patients.
- Furthermore, the proposed A-DIVA score may also be valuable in the evaluation of (cost-) efficacy and validation of the many venous access devices available in the market
- As this study is a clinical observation study number of success and failure of IV access may alter depending on experience of operator.

CONCLUSION

This study validated the previously derived five variable A-DIVA score.

- Applying the A-DIVA scale to surgical patients may increase the success rate of inserting a peripheral intravenous catheter on the first attempt. Otherwise, it creates a possibility to use other techniques, such as IR/USG, in an earlier time frame.
- Certain newer refinement variables are also found significant may also be helpful.

REFERENCES

1. Fredericus H. J. van Loon, Lisette A. P. M. Puijn, Saskia Houterman, et al. Development of the A-DIVA Scale: A Clinical Predictive Scale to Identify Difficult Intravenous Access in Adult Patients Based on Clinical Observations. Md-journal. Medicine _ Volume 95, Number 16, April 2016;1-8.
2. Yen K, Riegert A, Gorelick M. Derivation of the DIVA score: a clinical prediction rule for the identification of children with difficult intravenous access. Pediatr Emerg Care. 2008; 24:143–7.
3. Riker MW, Kennedy C, Winfrey BS, et al. Validation and refinement of the difficult intravenous access score: a clinical prediction rule for identifying children with difficult intravenous access. Acad Emerg Med. 2011; 18: 1129– 1134.