

Characterizing Risk Factors and Outcomes of Peripheral IV Extravasation Injuries in Neonates

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Background

- Peripheral intravenous (IV) extravasation is not uncommon in the neonatal period, with published incidences between 30-50%¹
- There is little margin of error in treating this patient population
- Current management protocols are highly inconsistent and lack clinical validation.

Objectives

- The purposes of this study were first, to characterize outcomes of IV extravasation injuries in neonates
- Secondly, to determine if there are predisposing or protective factors influencing clinical outcome.

Methods

- Institutional review was conducted of all patients 1 year or younger experiencing IV infiltration or extravasation requiring hand specialist evaluation between 1/2012-4/2017
- The primary outcome of interest was IV extravasation resulting in severe tissue injury, defined as Millam grade III/IV²
- Descriptive statistics, univariate tests of association, logistic regression performed

Millam Grading System for Extravasation / Infiltration Events

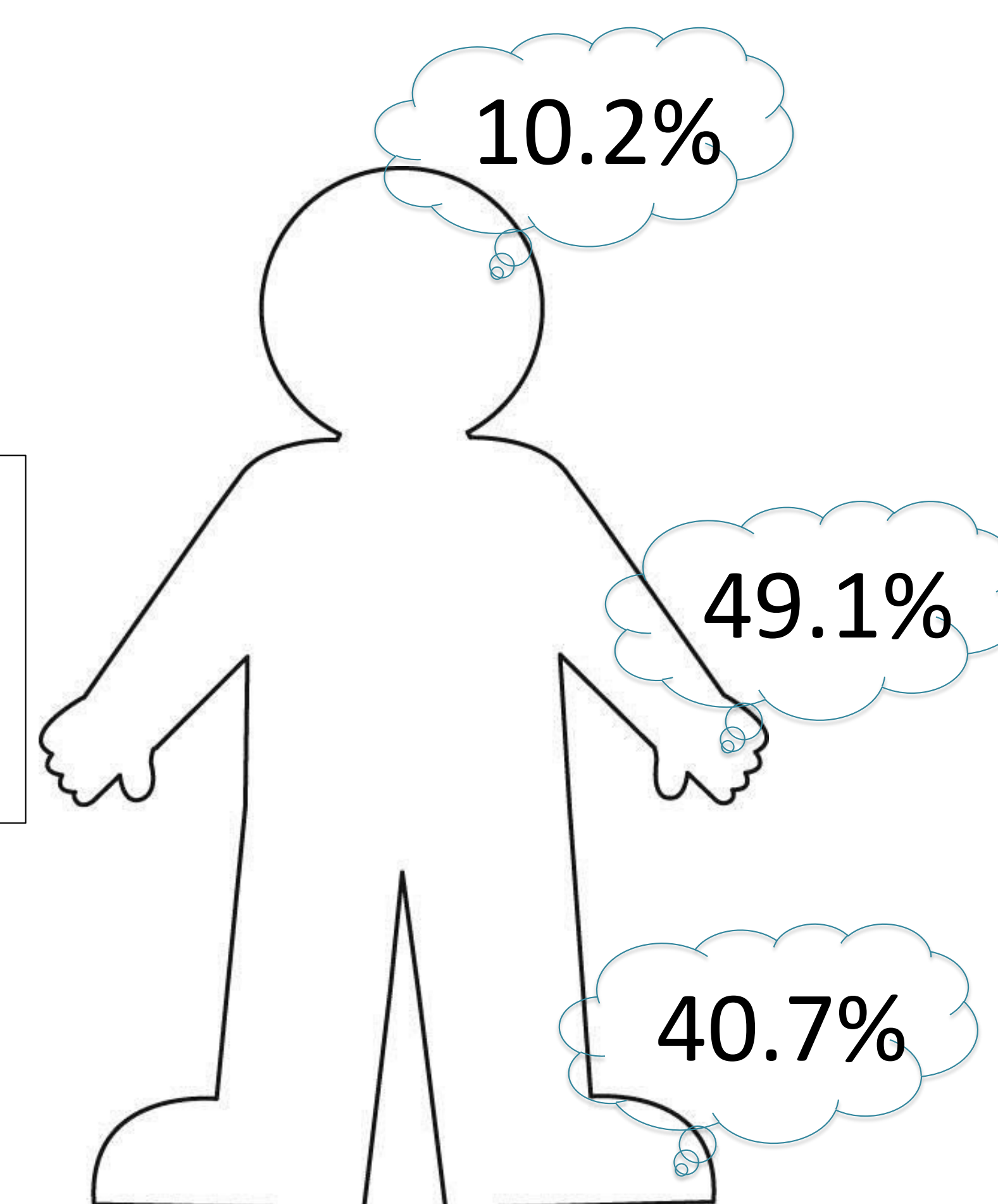
Grade 1	Grade 2	Grade 3	Grade 4
Pain at infusion site	Pain at infusion site Swelling No skin blanching	Pain at infusion site Swelling Skin blanching Cool blanched area	Pain at infusion site Swelling Skin blanching Cool blanched area
	Normal capillary refill and peripheral pulsation	Normal capillary refill and peripheral pulsation	Reduced capillary refill +/- Arterial occlusion +/- Blistering

Results

Patient Characteristics

- Age: 14 days (\pm) 29, range: 0-120
- Female: 54.6%
- Type of Infiltrate
 - TPN / Lipids: 98.1%
 - Other: 1.9%
- Hyaluronidase Given: 35.2%
- Delay in Consultation: 8.3%
- Millam Classification
 - Class I/II: 89.8%
 - Class III/IV: 10.2%

Incidence of Infiltration By Anatomic Site (Scalp, Upper Extremity, Lower Extremity)



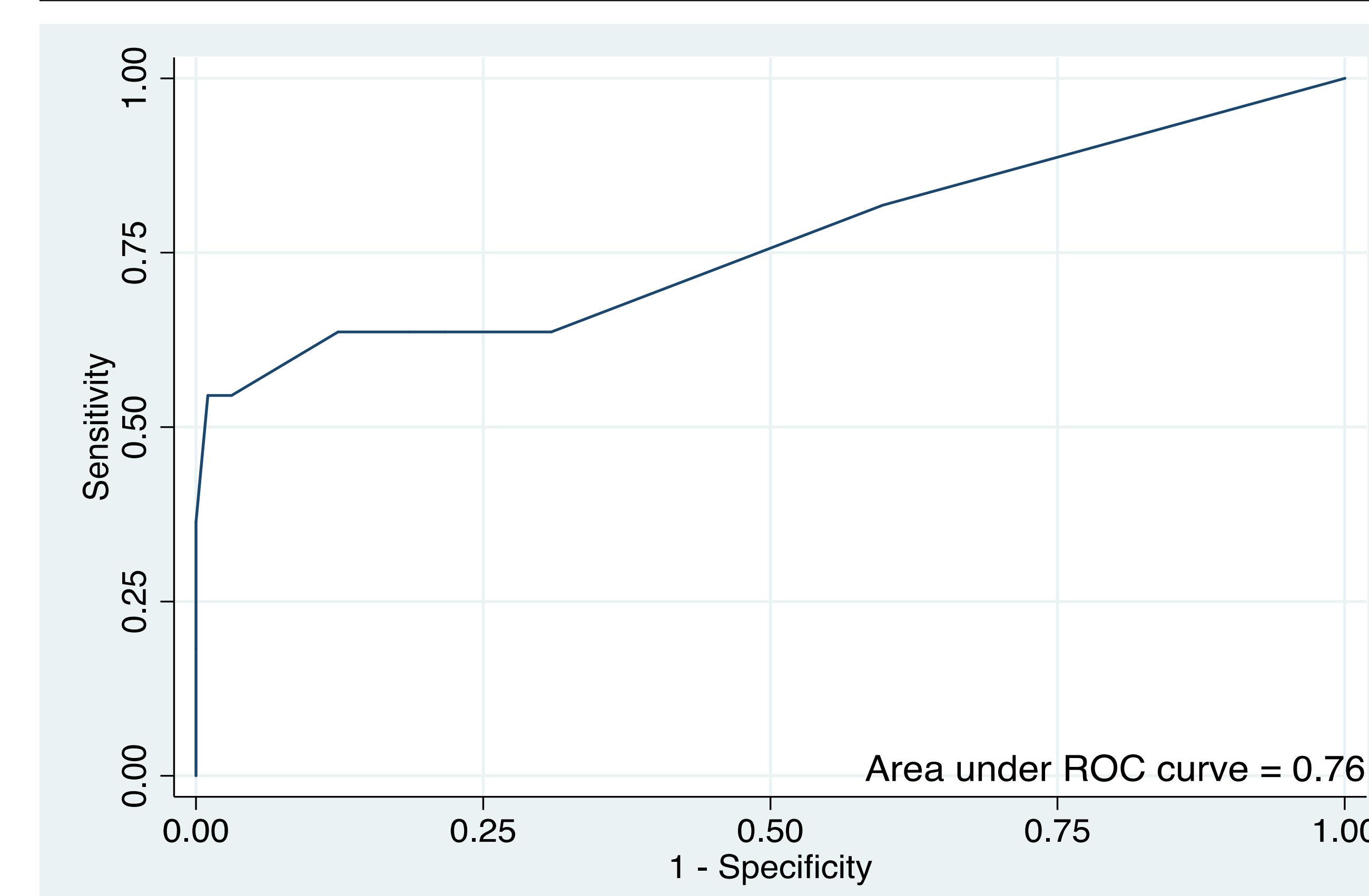
Predictors for High-Grade Wounds After IV Infiltration

Risk Factor	OR (95% CI)	P
Upper Extremity	ref	-
Scalp	8.8 (1.1 – 71.0)	0.042
Delay In Consultation	7.0 (1.3– 38.3)	0.026
Age > 8 Days	4.2 (1.1 – 16.4)	0.042

Note: High Grade Wound – Millam Class III/IV, OR – Odd's Ratio, CI – Confidence Interval. **Harrell's C Statistic = 0.76**

Results (cont.)

ROC Curve for Predictive Capacity of Logistic Risk Model

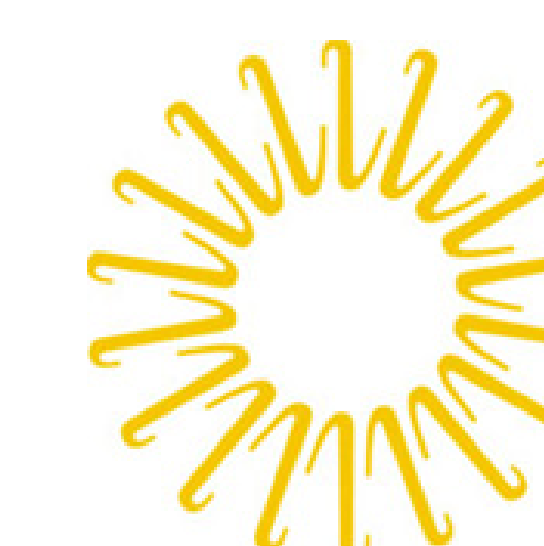


Outcomes

- No Change in Treatment: 55.6%
- Change In Local Wound Care: 5.7%
- Serial Exam: 38.0%
- Major Complication: 1.0%

Conclusions

- Although extravasation injuries rarely progress to require operative intervention, they can have devastating consequences in neonates.
- This study indicates that prompt specialist referral is critical to avoid significant morbidity.
- Predictive risk modeling represents an evidence-based, accurate, and reliable means of anticipating clinical course in order to prevent further complications in this vulnerable patient population



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References:

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- Kostogloudis N, Demiri E, Tsimponis A, et al. Severe Extravasation Injuries in Neonates: A Report of 34 Cases. *Pediatric dermatology.* 2015;32(6):830-835
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