

Paediatric IV cannulation: are steps to increase success all in vein?

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Background

- 1 yr Starship ED (Auckland)
 - ~30,000 ED presentations
 - ~ 8,000 cannulas used
- IV cannulation important for Mx of sick kids
- IV cannulation failure is painful, distressing, time consuming
 - What factors are associated with success?



RCTs of parental presence during procedures

Study 'Yr	Procedure	Age (yrs)	N	Results for caregiver presence
Gross '83	Venipuncture	4-10	54	Child distress: no diff
Wolfram '96	Venipuncture	8-18	130	Child distress: ↓ Parent distress: ↓
Wolfram '97	Venipuncture	1-7	96	Child distress: ↓ Parents distress: ↓
Bauchner '96	Venipuncture IV cannulation U catheterisation	<3	431	Parent satisfaction: no diff Number attempts: no diff

Piira T et al. The role of parental presence in the context of children's medical procedures: a systematic review. *Child Care Health Dev.* Mar 2005;31(2):233-243.

Bauchner '96

- Parent-child randomised into three groups
 - Opted out if didn't like their group
- Three procedures
 - Venipuncture, IV cannulation, catheterisation
 - IV cannulation (n=44,34,42)
- Multiple outcomes (distress & success)
- Number of attempts: Parent presence NS

What we know

- Caregiver presence
 - Is the preferred option for 90% caregivers
 - ↓ anxiety for child
 - ↓ anxiety for caregiver
 - ↑ anxiety for some clinicians

What we don't know

- Does caregiver presence ↓ success
- Does topical anaesthesia ↓ success

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What we don't know

- Does caregiver presence ↓ success
- Does topical anaesthesia ↓ success

Pop
Quiz

Y

or

N

Background

- What are the outcomes?
 - Procedure success
 - Distress to child
 - Distress to caregiver
 - Distress to staff

Aims

■ What are the outcomes?

■ Procedure success ←

- Distress to child
- Distress to caregiver
- Distress to staff



■ What factors could be associated with success?

- Child factors (eg, age, gender, vein visibility)
- Clinician factors (eg, seniority, local anaesthetic use)
- Other factors (eg, IVC lumen size, who assists)

Methods

- Prospective quality assurance project
- All IV cannulation attempts in Starship ED
 - Sep 2005 to July 2007
 - First attempt only
 - Resuscitation excluded
- Standardised data collection form

Hospital ID: (sticker)		DOB:	Sex (m/f):					Date:
		1ST	2ND	3RD	4TH	5TH	6TH	
VEIN <small>(before/transillumination)</small>	Visible & distended	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Visible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Poorly visible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
OUTCOME	Successful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Couldn't find vein	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fell out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Tissued	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PERSON	House Officer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Registrar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Fellow/Senior	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Nurse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
LUER SIZE	24 (yellow)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	22 (blue)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	20 (pink)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SITE	Hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Wrist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Forearm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Antecubital	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Foot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PRESENT <small>(multiple allowed)</small>	Nurse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Caregiver	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Play specialist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
POSITION	Wrapped	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Lying flat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Being cuddled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Sitting or inclined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
ANALGESIA	None (why?)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	EMLA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Ametop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Ethyl Chloride	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Sucrose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
WEESIGHT (transillumination)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Child factors

Clinician factors

Other factors

Results

Dataset	%
Boy	54
Caregiver present	86
Play therapist present	13
Cannula size (22G)	63

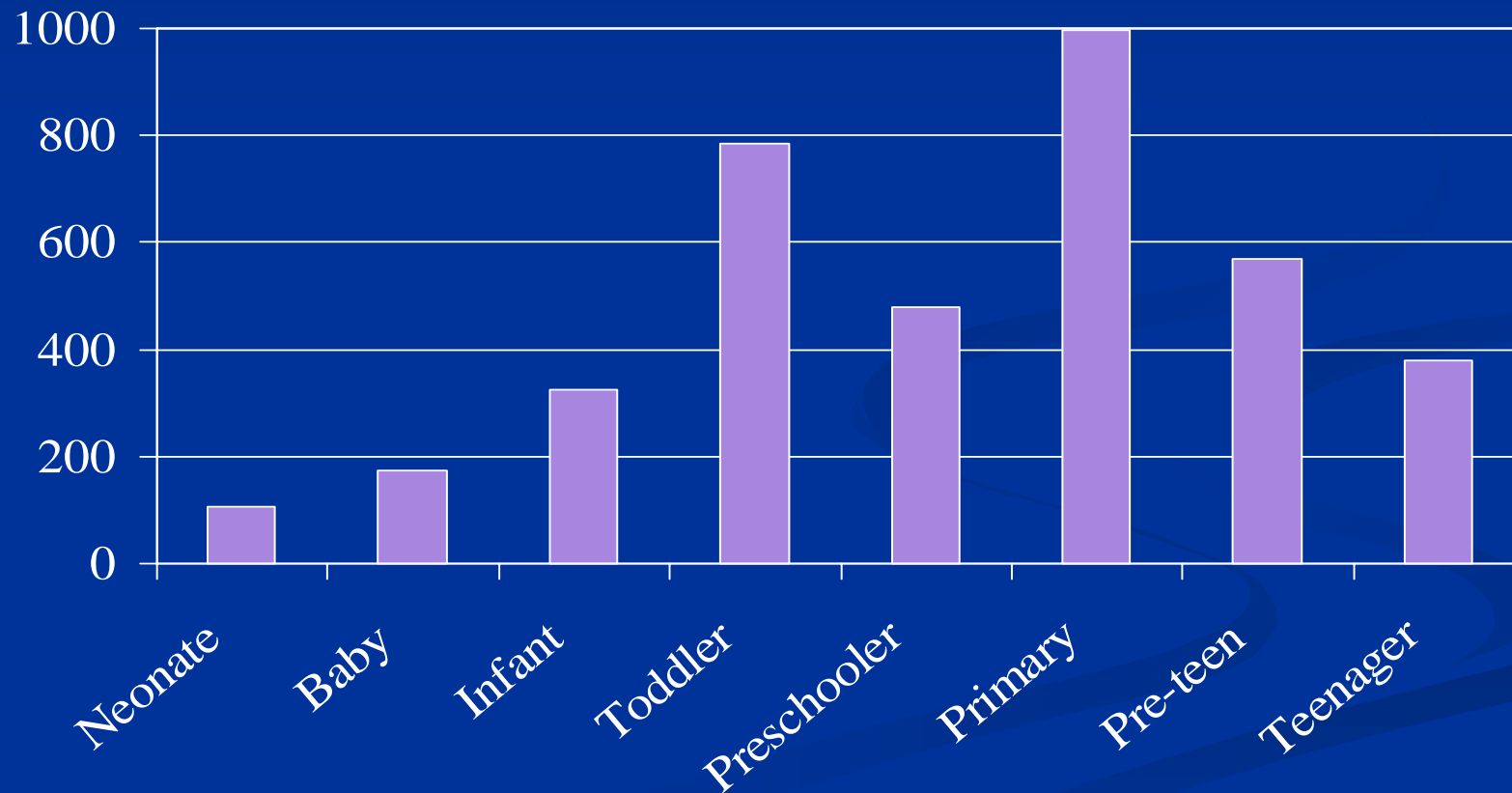
Total cannulas used in
ED over study period
Estimated N ~7,000

Our study sample
N = 4,148 (56%)

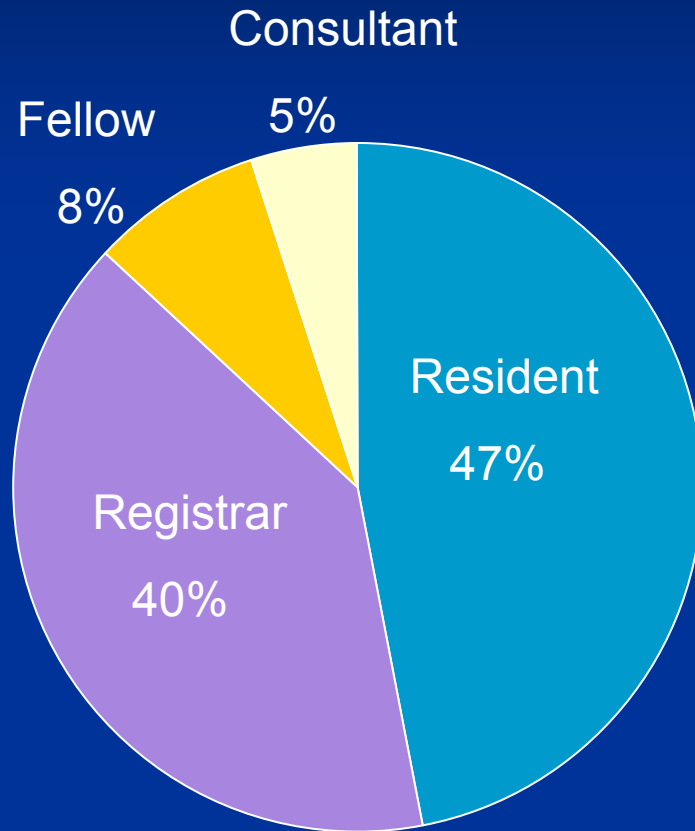
Caregiver data section
completed
n = 3,889 (94%)

Results

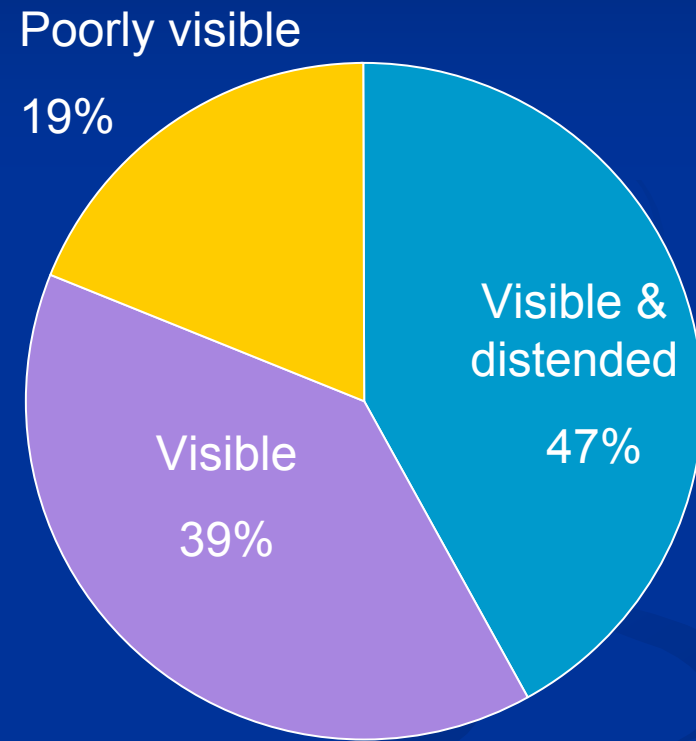
- Number of children in each age strata



Results



■ Clinician seniority



■ Vein visibility

Results

- Success rates?



Child factor		% success	P (unadj)
Gender	Boys	74	0.4
Age	Neonate	62	< 0.0001
	Baby	63	
	Infant	60	
	Toddler	70	
	Preschooler	74	
	Primary	79	
	Pre-teen	80	
	Teenager	81	
Vein	“Good”	92	< 0.0001
	“Average”	73	
	“Bad”	40	

Results

Clinician factor		% success	P (unadj)
Seniority	Consultant	83	< 0.0001
	Fellow	81	
	Registrar	77	
	Resident	69	

Results

Other factors		% success	P (unadj)
Cannula gauge	22G	78	< 0.0001
	24G	67	
Caregiver	Present	74	0.47
	Absent	75	

Results

- Logistic Regression Model to 1st attempt success
 - Child factors, Clinician factors & Other factors
- Univariate:
 - Clinically & statistically significant: vein visibility ($R^2=0.15$)
 - No other factor was clinically significant (using $R^2>0.02$)
 - Age, seniority, gauge minor clinical significance ($R^2=0.01-0.02$)
- Multivariate:
 - Vein visibility is the only clinically significant independent predictor
 - Clinician seniority weak independent predictor of success
 - Age of child and cannula gauge not predictive

Conclusions

- No evidence to support hypothesis that caregiver presence decreases success rate
- No evidence to support hypothesis that topical anaesthesia decreases success rates
- Its all in the vein!