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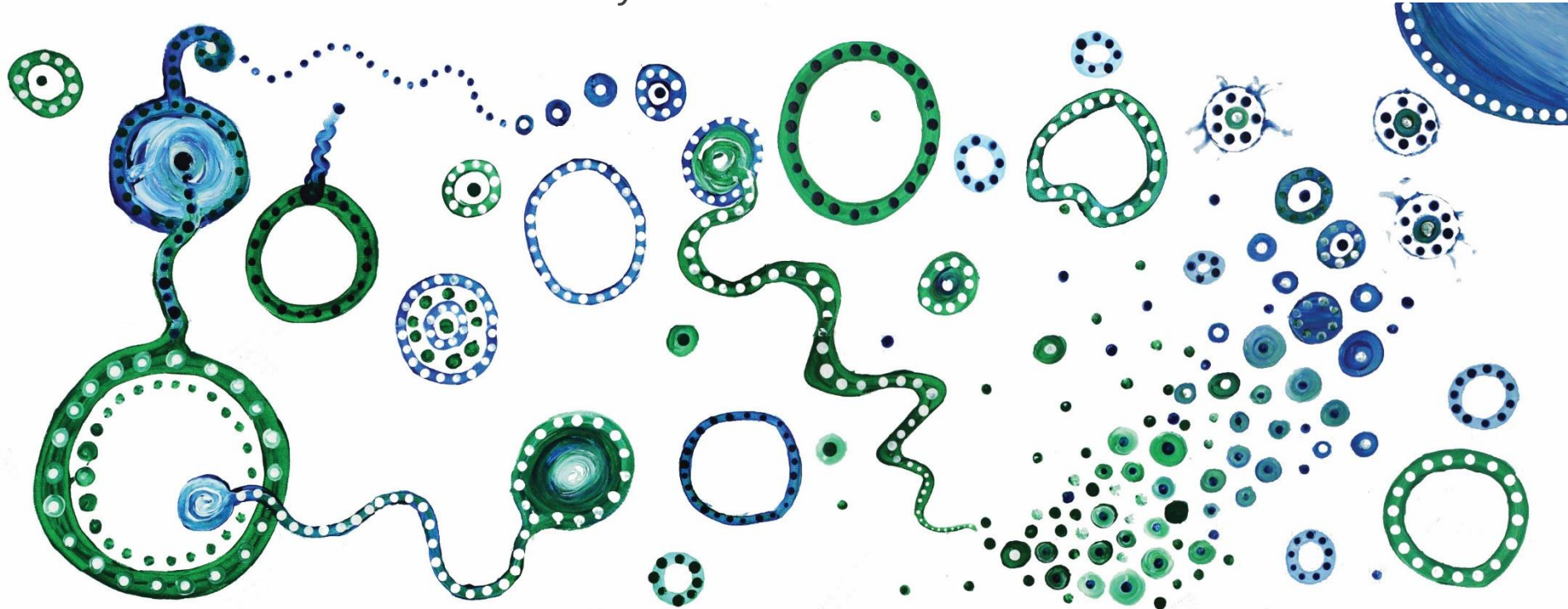
Paediatric Intubation in Australian and New Zealand Emergency Departments

How, Whom, When and Why and are there improvement opportunities?

ACEM ASM Perth 2018

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The ACI acknowledges the traditional owners of the land we meet on today,
the Wadjuk people of the Nyoongar nation and that land we work on
– the Cammeraigal People of the Eora Nation. We pay our respects to
Elders past and present and extend that respect to other Aboriginal peoples on
whose country this research was undertaken.



“Emergency Intubation is a high-risk, low frequency procedure for paediatric patients. Providers must perform emergency intubation for children competently and safely, yet exposure is rare for individual providers”

Benjamin Kerrey 2017

Study	Setting	Study Design (n)	Indication for Intubation	Intubator	Proportion RSI	First Pass Success	Adverse Events
Pallin 2016	USA, Canada, Australia (NEAR 2)	Prospective Observational Multicentre Registry (n= 1053)	Trauma 50% Medical 43% Other 6.8%	ED 87% Paed 6% Anaes 3%	81%	83%	Oesophageal Intubation 4% Other* 3% Mainstem 2.5% Cardiac Arrest 2%
Sagarin 2012	USA (NEAR 1)	Prospective Observational Multicentre Registry (n= 156)	Trauma 49% Medical 49% Other 2%	ED 79 % Paed 10%	81%	72%	Mainstem 41% Oesophageal 19% Desaturation 1%
Goto 2016	Japan (JEAN 1 &2)	Prospective Observational Multicentre Registry (n=293)	Medical 47% Trauma 24% Cardiac Arrest 29%	ED 43% Paed 15% JMO 218% Other 23%	26%	60%	NR
Choi 201 2	Korea	Prospective Observational Multicentre Registry (n=281)	Medical 71 % Trauma 29%	ED 57% Other 22% Paed 19%	12%	68%	Mainstem Bronchus 2% Vomiting 2%
Kerrey 2012	USA (Cincinnati)	Single site Retrospective Video and Chart Review (n=112)	Medical 78% Trauma 22%	ED 81% ICU 9% Anaes 10%	100%	52%	Physiologic Deterioration 39% Tube Misplacement 10%

Study	Setting	Study Design	Indication for Intubation	Intubator	Proportion RSI	First Pass Success	Adverse Events
Long 2014	ED, Melbourne	Prospective Observational Single Centre (n= 71)	Medical 79% Trauma 21%	ED 63% ICU31%		78%	Hypotension 21% Desaturation 14%
Ngyuen & Craig 2016	3 ED Network, Victoria	Retrospective Chart Review of Resus Area patients (n=35)	NR	ED Cons 46% ED JMO 13% Anaes 38% NICU 3%		89%	NR
Burns et al 2017	HEMS, Sydney	Prospective Observational Single Service (n=82)	Trauma 83% Medical 17%	Paramedic 48% Medical 52%	Cold 16% RSI 84%	91%	Desaturation 6% Mainstem Intubation 3% Oesophageal Intubation 2%

Australia & New Zealand Airway Registry



NSW
Royal North Shore Hospital
Mona Vale Hospital
Royal Prince Alfred Hospital
St George Hospital
St Vincent's Hospital
Westmead Hospital
Wollongong Hospital
Hornsby Ku-Ring-gai Hospital
Manly Hospital
Prince Of Wales Hospital
Liverpool Hospital
Blacktown Hospital
Mount Druitt Hospital
Lismore Base Hospital
Wagga Wagga Base Hospital
Dubbo Hospital
Tweed Hospital
The Tweed Hospital
John Hunter Hospital
Albury Wodonga Hospital
Care Flight NSW
Calvary Mater Hospital
Children's Hospital at Westmead
Orange Hospital
Nepean Hospital
Port Macquarie Hospital
Queanbeyan Hospital
Tamworth Hospital
Bowral & District Hospital
Sutherland Hospital



Tasmania
Royal Hobart Hospital

Northern Territory
Gove District Hospital
Royal Darwin Hospital

Western Australia
Sir Charles Gairdner Hospital
Peel Health Hospital
Rockingham Hospital

Queensland
The Townsville Hospital
Queen Elizabeth II Jubilee Hospital
Princess Alexandra Hospital
Cairns Base Hospital
Caloundra Hospital

Victoria
Western Health Hospital
Sunshine Hospital
The Northern Hospital Victoria

New Zealand
Middlemore Hospital
Wanganui Hospital
Auckland City Hospital
Waikato Hospital

Data Collection Tool



AUSTRALIA & NEW ZEALAND ED AIRWAY REGISTRY

To be completed for ALL intubations in the Emergency Department

Name	Medical Record Number	Date:
Place Patient Sticker Here		Estimated Patient Weight:
Age	Gender	Team Leader:
		Specialty + Seniority (eg ED Reg)

Indication For Intubation – Tick ONE only

Trauma:	Medical:	Other (please state):
Head injury – reduced LOC ☐	Respiratory failure ☐	Altered mental status – not overdose ☐
Head injury – airway not patent ☐	Airway obstruction ☐	Overdose / ingestion ☐
Neck / facial trauma ☐	Anaphylaxis ☐	Cardiac arrest ☐
Burn / inhalation ☐	Cardiac failure ☐	
Drowning ☐	Sepsis ☐	
Chest trauma ☐	GI bleed ☐	
Shock ☐	Seizure ☐	
Traumatic cardiac arrest ☐	ICH/stroke ☐	

Was laryngoscopy predicted to be difficult?

Y / N

Was a formal assessment made?

Y / N

Why difficult? eg "LEON" criteria (See over)	
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Observations	At time of Decision to Intubate	GCS	RR	SBP	HR	SaO ₂
	First set AFTER INTUBATION					

Preox* Final device used	NRBM ☐	BVM ☐	BVM+PEEP ☐	CPAP/BIPAP ☐	LMA ☐	Patient Position Tick One	Flat ☐	Bed tilted head up ☐
Apnoeic O ₂ [†] Tick all that apply	NIL ☐	NP ☐	BVM ☐	CPAP/BIPAP ☐	LMA ☐		Pillow or occipital pad ☐	Ramped or head up ☐

Was a Pre-RSI Checklist Used?	Y / N
Time Of Induction (24 Hrs)	:
Time Of Intubation (24 Hrs)	:

Medication For Induction

NIL	Other (state)
Ketamine ☐	dose (mg)
Thiopentone	dose (mg)
Propofol	dose (mg)
Fentanyl	dose (mcg)
Suxamethonium	dose (mg)
Rocuronium	dose (mg)

Attempt	Intubator	Specialty + Seniority (eg ED Reg)	No. Previous Intubations (Please circle)	Laryngoscope M=Macintosh V=Video (Type) O=Other (State)	Cormack & Lehane Grade (1-2-3-4) Direct Vision Video	B-bougie S=stylet N=neither	External Laryngeal Manipulation (Y/N)	Cricoid (Y/N)	Manual In-line Stabilisation (Y/N)
1			<10 10-100 >100						
2			<10 10-100 >100						
3			<10 10-100 >100						
4			<10 10-100 >100						
5			<10 10-100 >100						

*NRBM = Non Re-Breather Mask, BVM = Bag Valve Mask, BVM+PEEP = PEEP Valve attached to BVM, CPAP/BIPAP = NIV for preoxygenation

[†]NP = Nasal Prongs, BVM = Active Ventilation using BVM after induction until laryngoscopy, CPAP/BIPAP = NIV after induction until laryngoscopy

PLEASE TURN OVER

ETT Placement Confirmation – Tick one only		
Waveform capnography ☐	Colour change capnometry ☐	Clinical confirmation alone ☐

Intubation Manoeuvres – Tick all that apply		
NIL ☐	Cricoid pressure removed ☐	
Guedel / NPA inserted post induction ☐	LMA inserted post induction ☐	
BVM ventilation after failed attempt ☐	Patient position changed ☐	
	Surgical airway ☐	

Intubation Complications – Tick all that apply		
NIL ☐	Oesophageal intubation ☐	
Equipment Failure – state what in comments ☐	Mainstem bronchial intubation ☐	
Desaturation – SaO ₂ < 93% ☐	Vomit – no aspiration ☐	
Bradycardia – HR < 60bpm ☐	Vomit – with aspiration ☐	
Hypotension – requiring IV fluid/pressors ☐	Laryngospasm ☐	
Dental trauma due to intubator ☐	Medication error ☐	
Airway trauma by intubator ☐	Cardiac arrest ☐	
Second dose of paralytic agent ☐	Other (State in Comments) ☐	

Disposition					
ICU ☐	Theatre/ Angio/ Cath Lab ☐	Transferred to another hospital ☐	Required subsequent re-intubation in ED. Please complete another airway form ☐	Extubated in ED ☐	Died in ED ☐

Comments

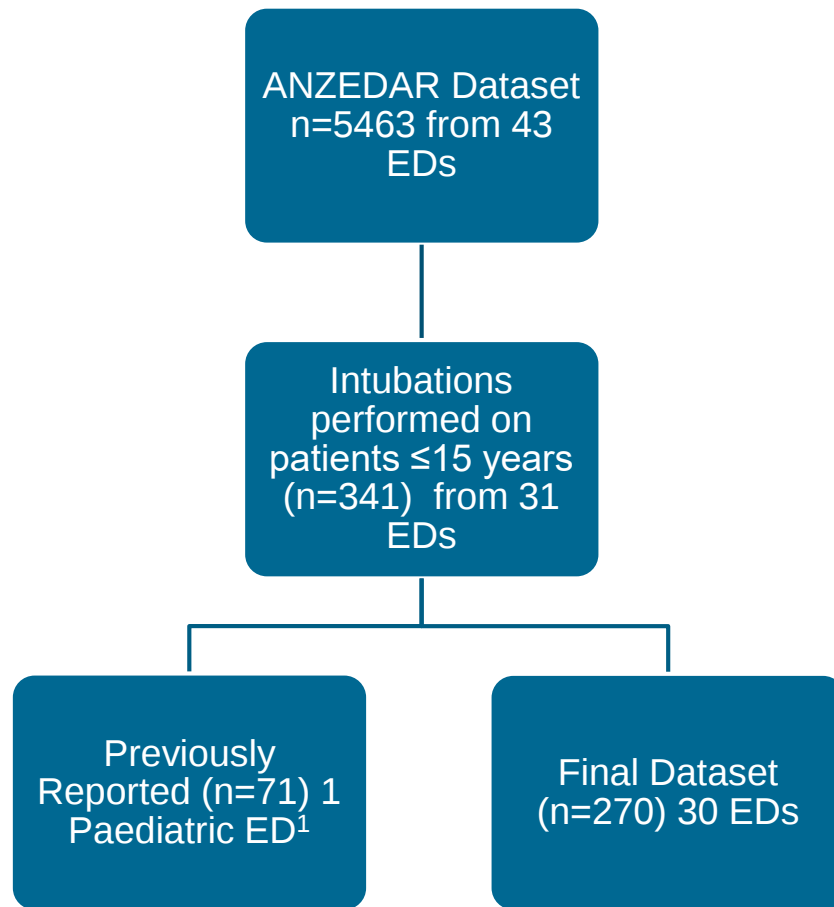
THANK YOU

"LEON" Evaluation	Cormack and Lehane Grading
Look Externally: Facial Trauma Large Incisors Beard or Moustache Large Tongue	Grade I Grade II
Evaluate 3-3-2 Rule: Inter incisor distance ≥ 3 fingers Hyoid-mental distance ≥ 3 fingers Thyroid-hyoid distance ≥ 2 fingers	Grade III Grade IV
Obstruction (eg haematoma, epiglottitis, large tonsils)	
Neck mobility limited?	

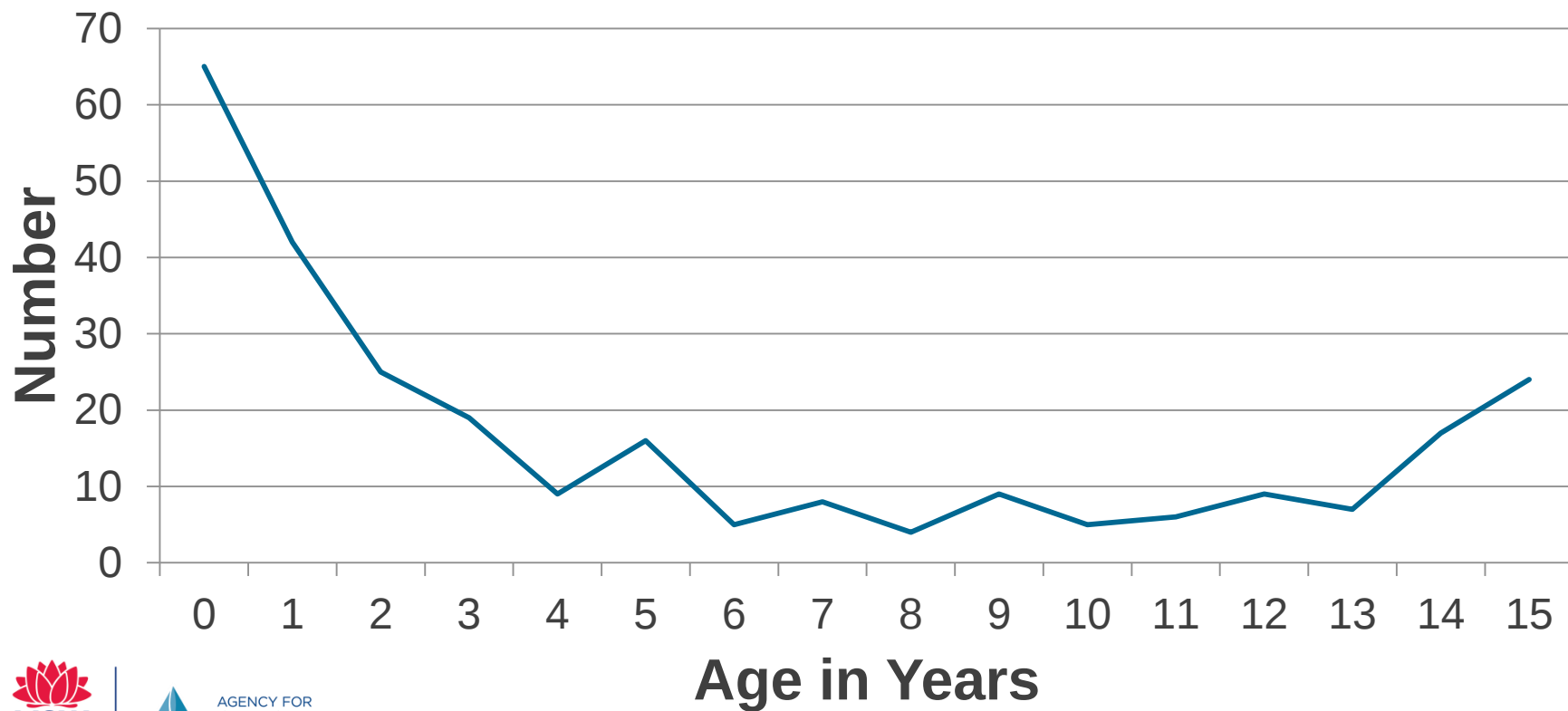
Admin use only:

Data reviewed ☐	Data complete ☐	More data required ☐	Form updated ☐	Record complete ☐	Sequence No.
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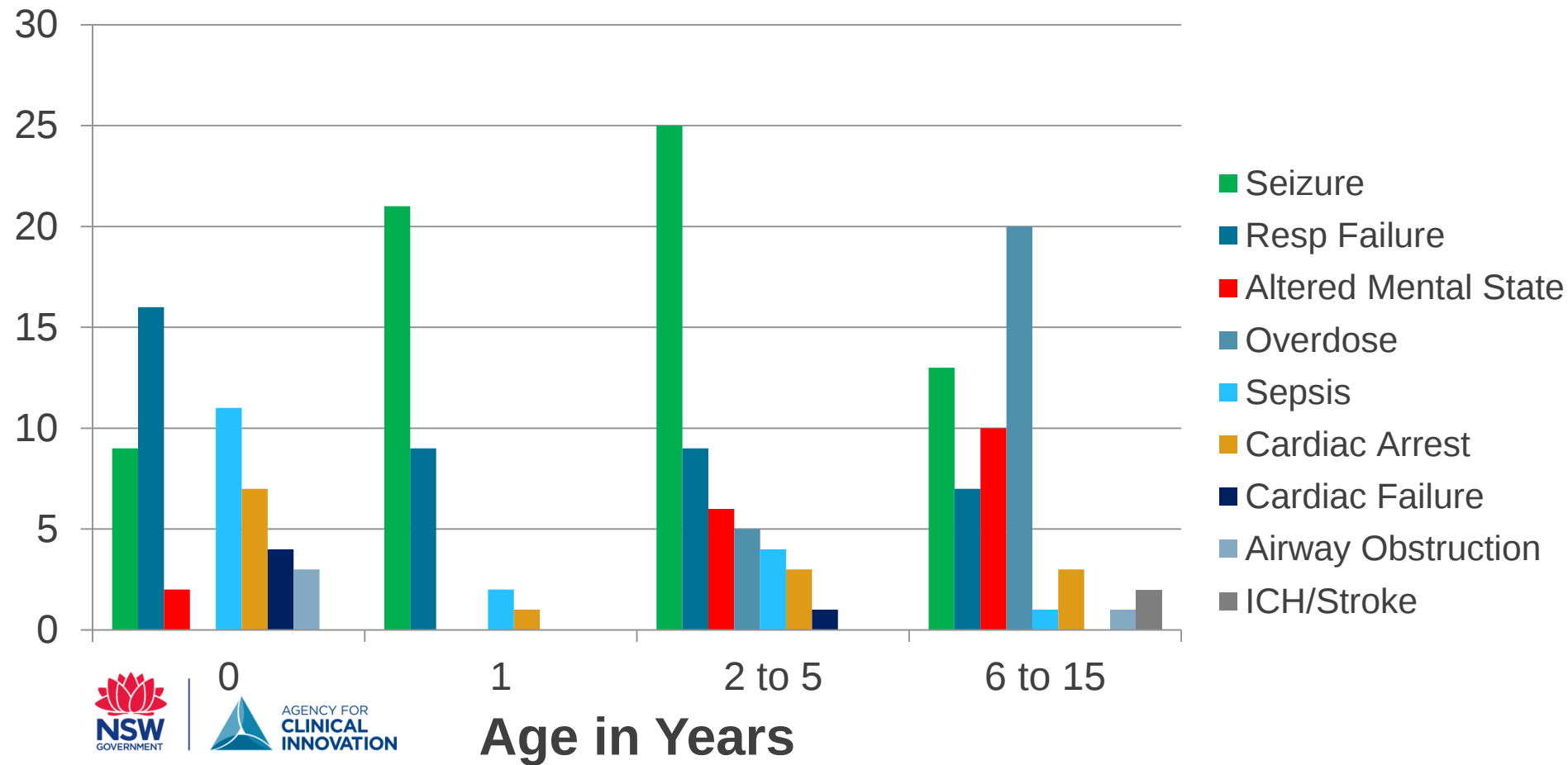
Developed by Toby Fogg, John Vassiladis, Alex Tzannes, John Mackenzie and Matt Murray.



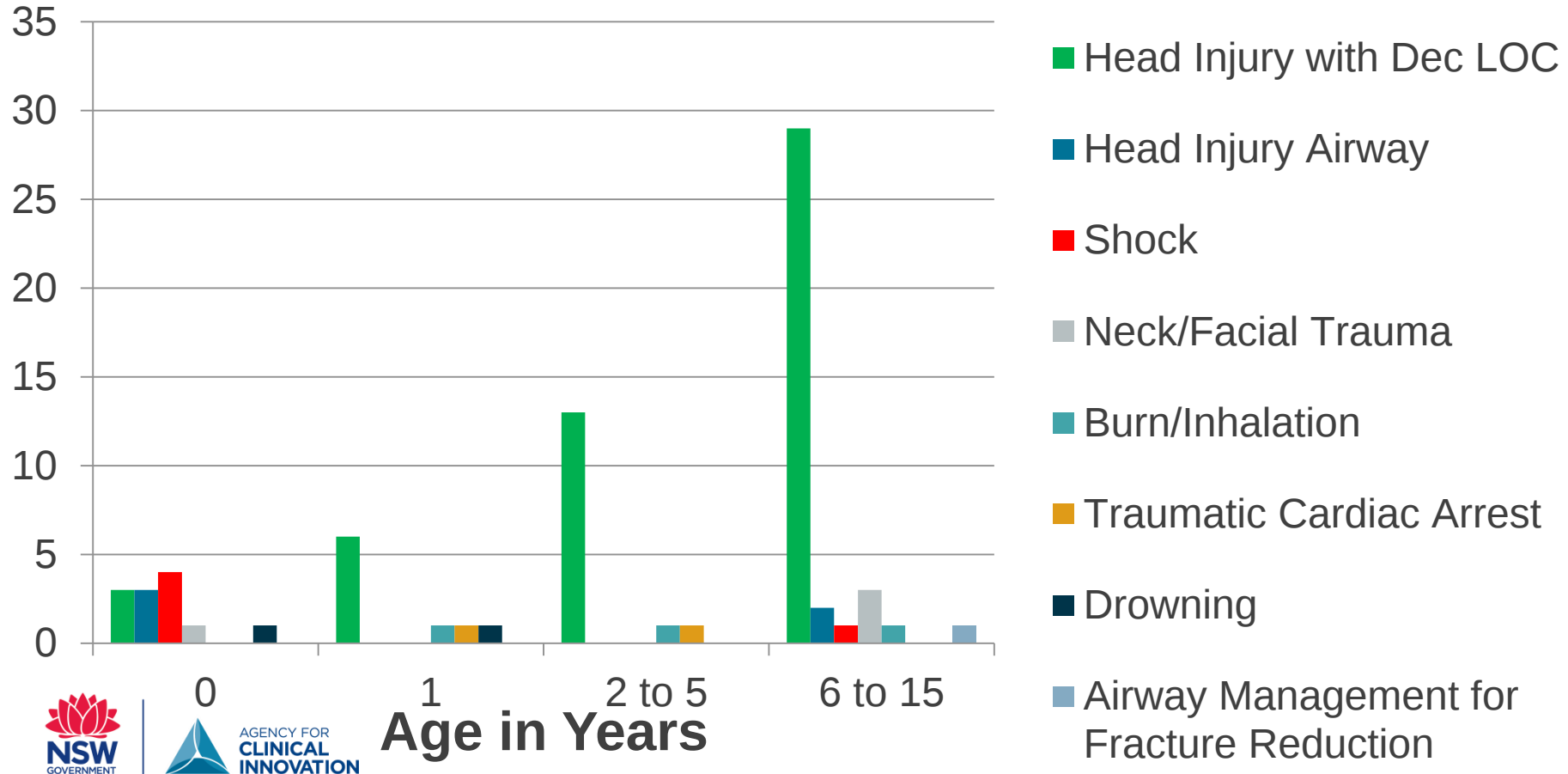
Intubations by Age (n=270)



Medical Indication for Intubation (n=195)



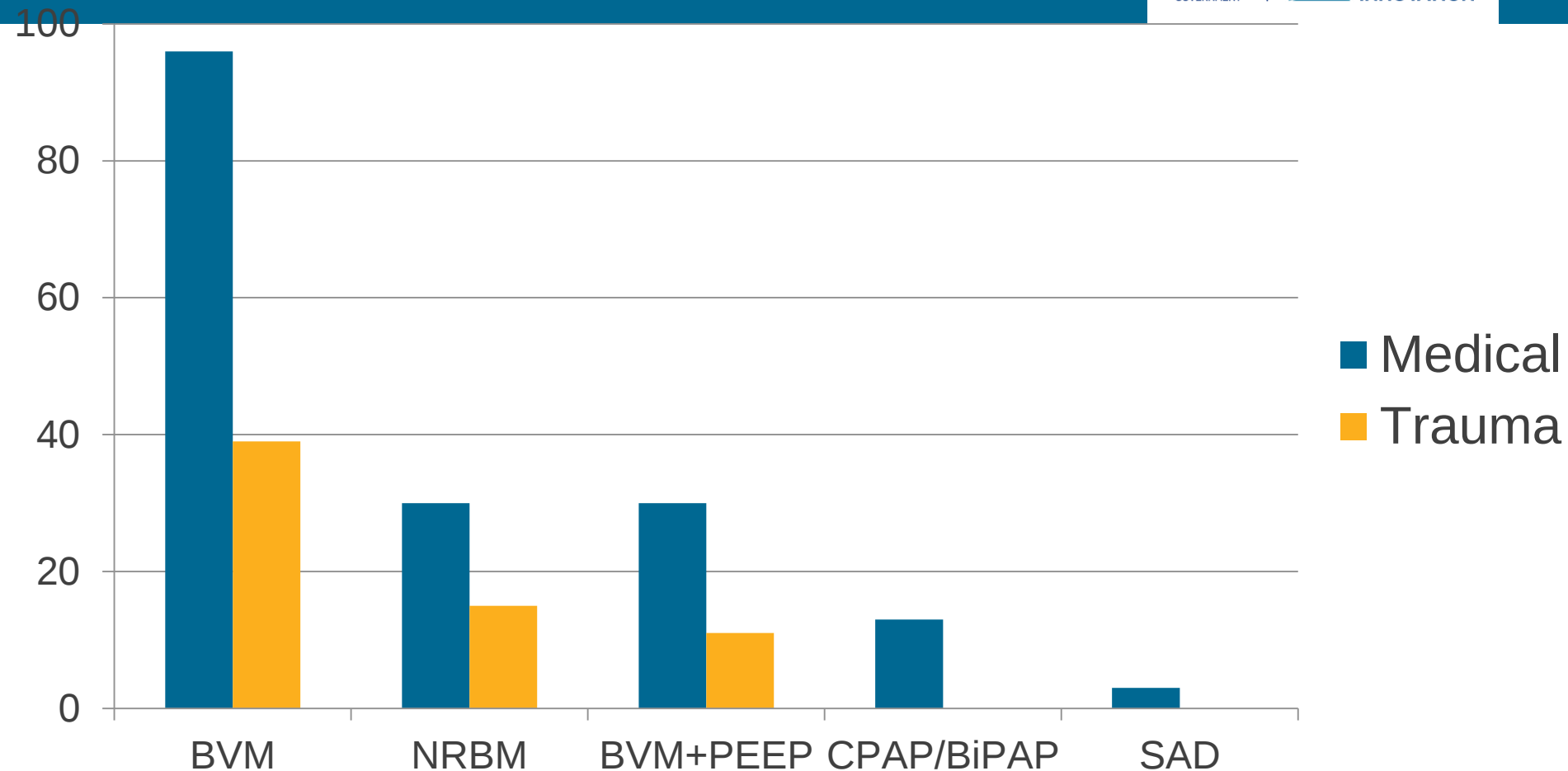
Traumatic Indication for Intubation (n=73)



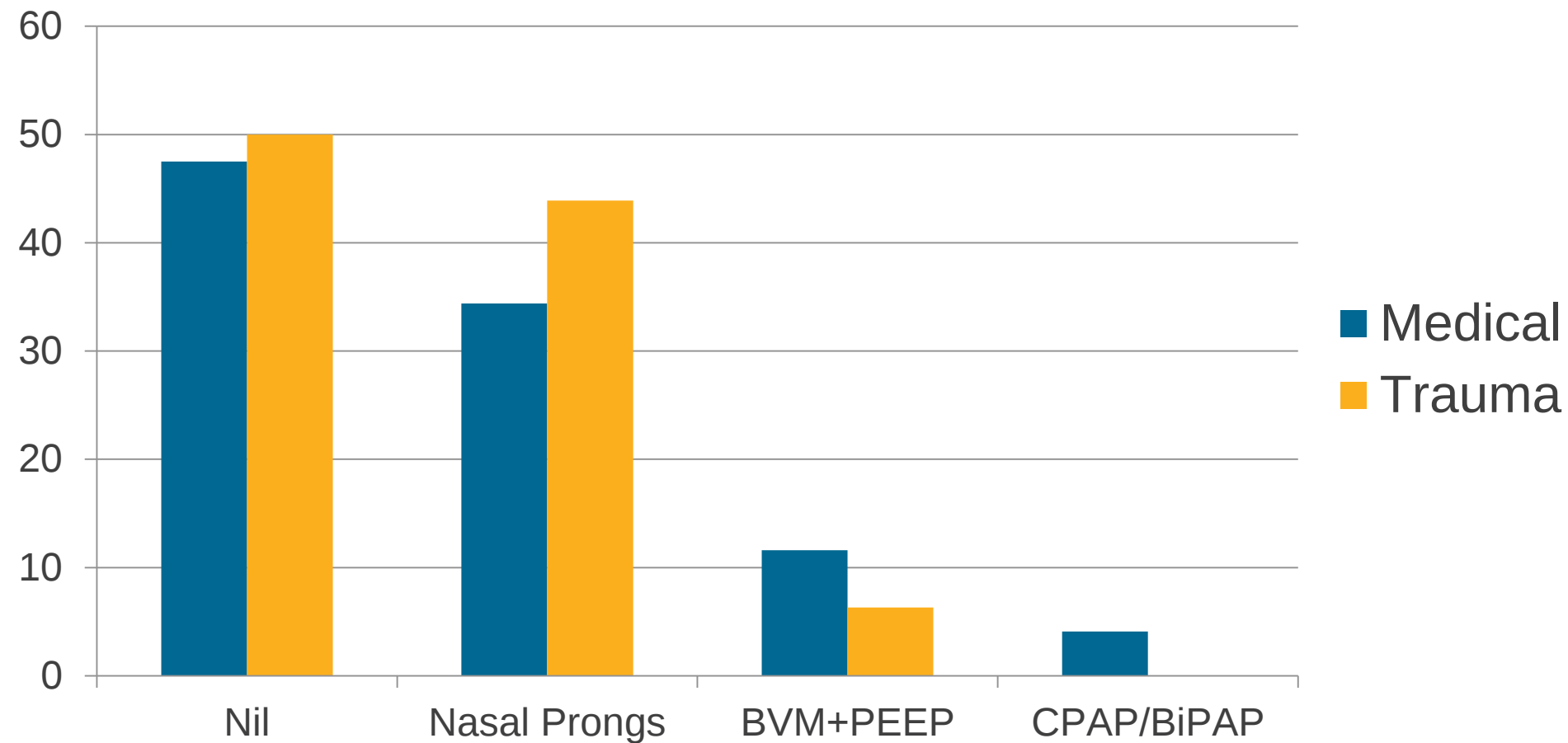
Vital Signs at Time of Decision to Intubate

Vital Signs*	Medical	Trauma	Overall
GCS <9	136 (76.4)	35 (51.5)	171 (69.5)
SBP Hypotension	21 (13.3)	7 (10.8)	28 (12.6)
Respiratory Rate Tachypnea	44 (27.5)	5 (8.1)	49 (22.1)
Bradypnea	44 (27.5)	20 (32.3)	64 (28.8)
SpO₂ Hypoxic	32 (18.6)	6 (9.0)	38 (15.9)

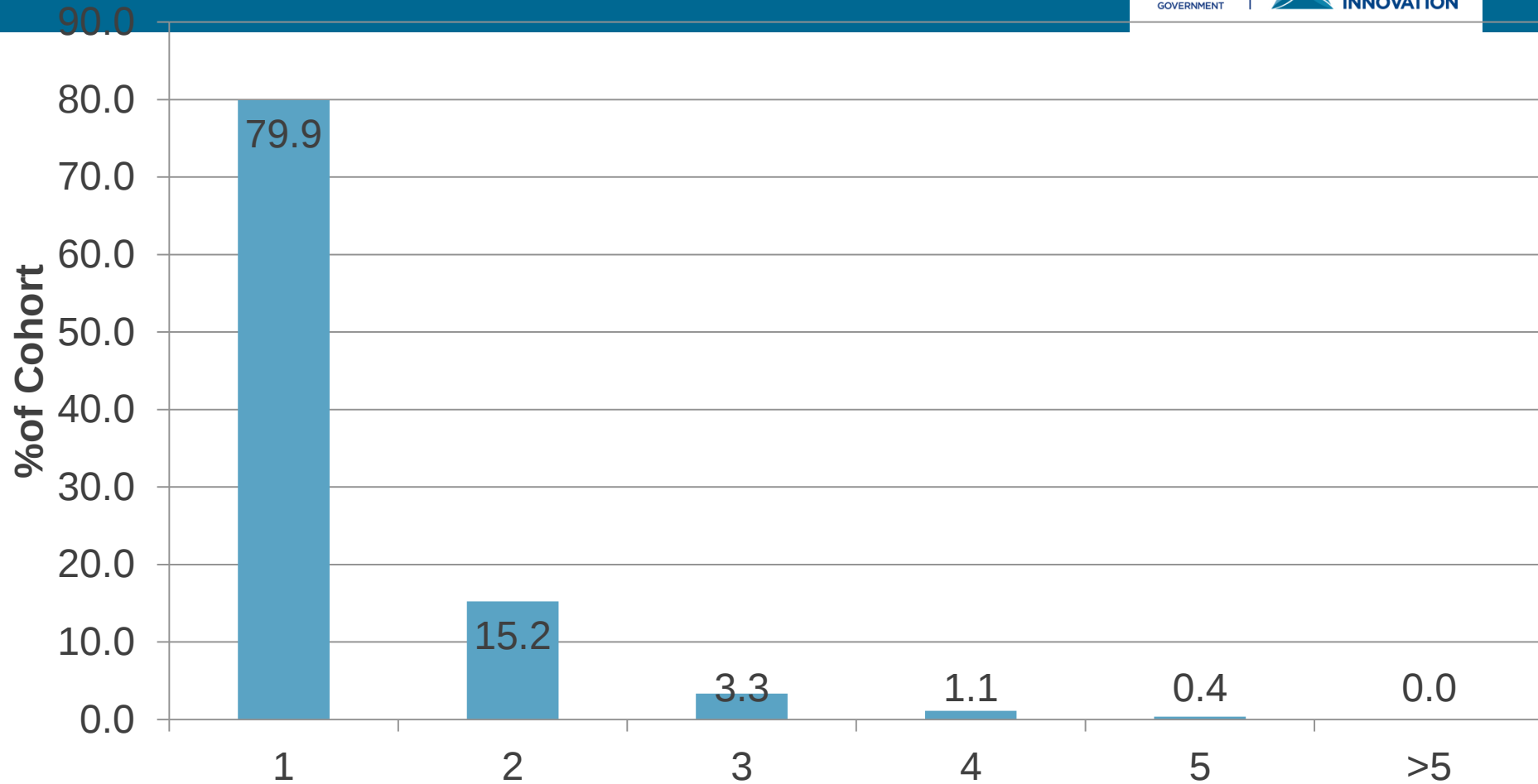
Pre-oxygenation Technique (n=270)



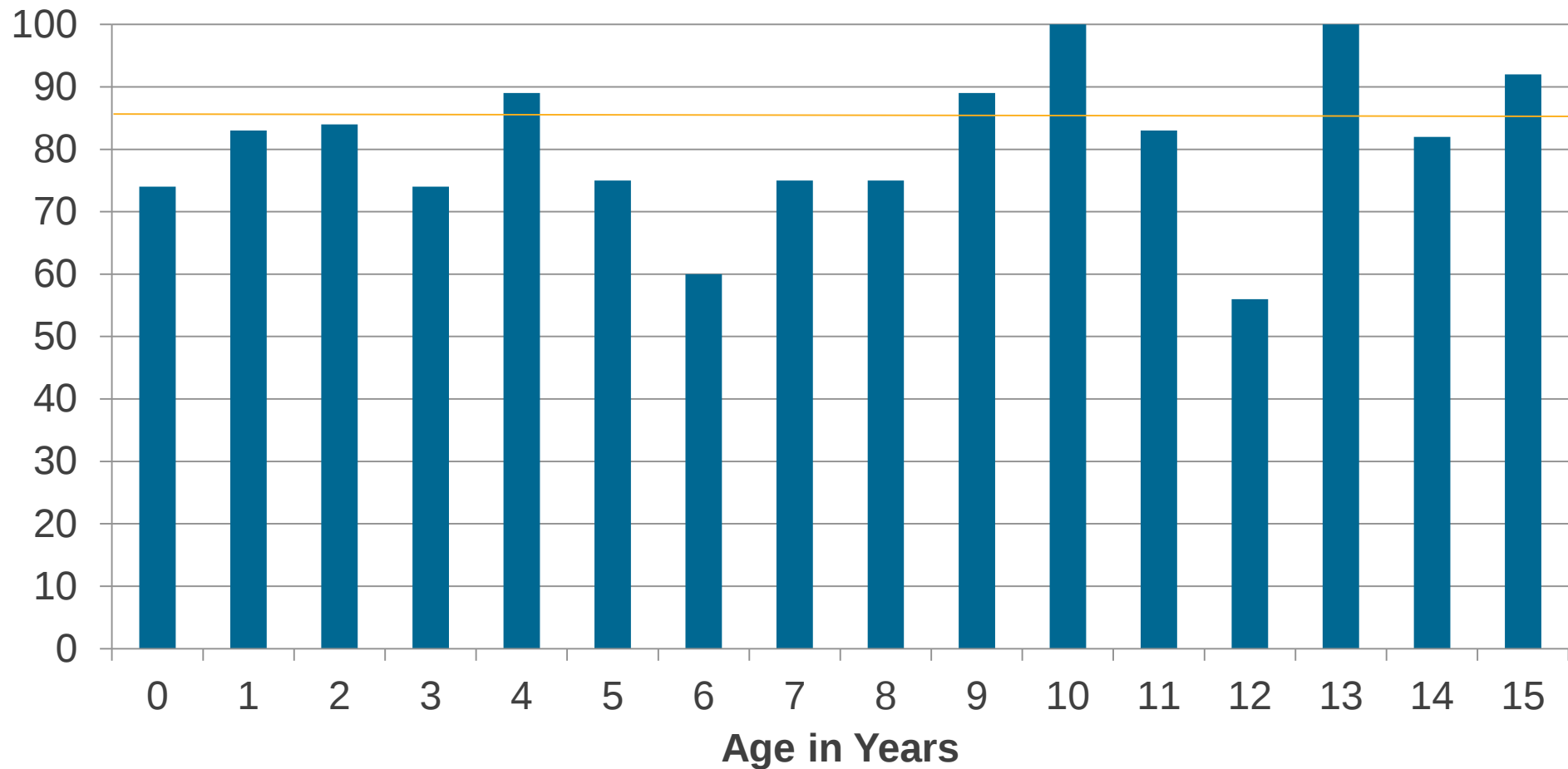
Apnoeic Oxygenation %



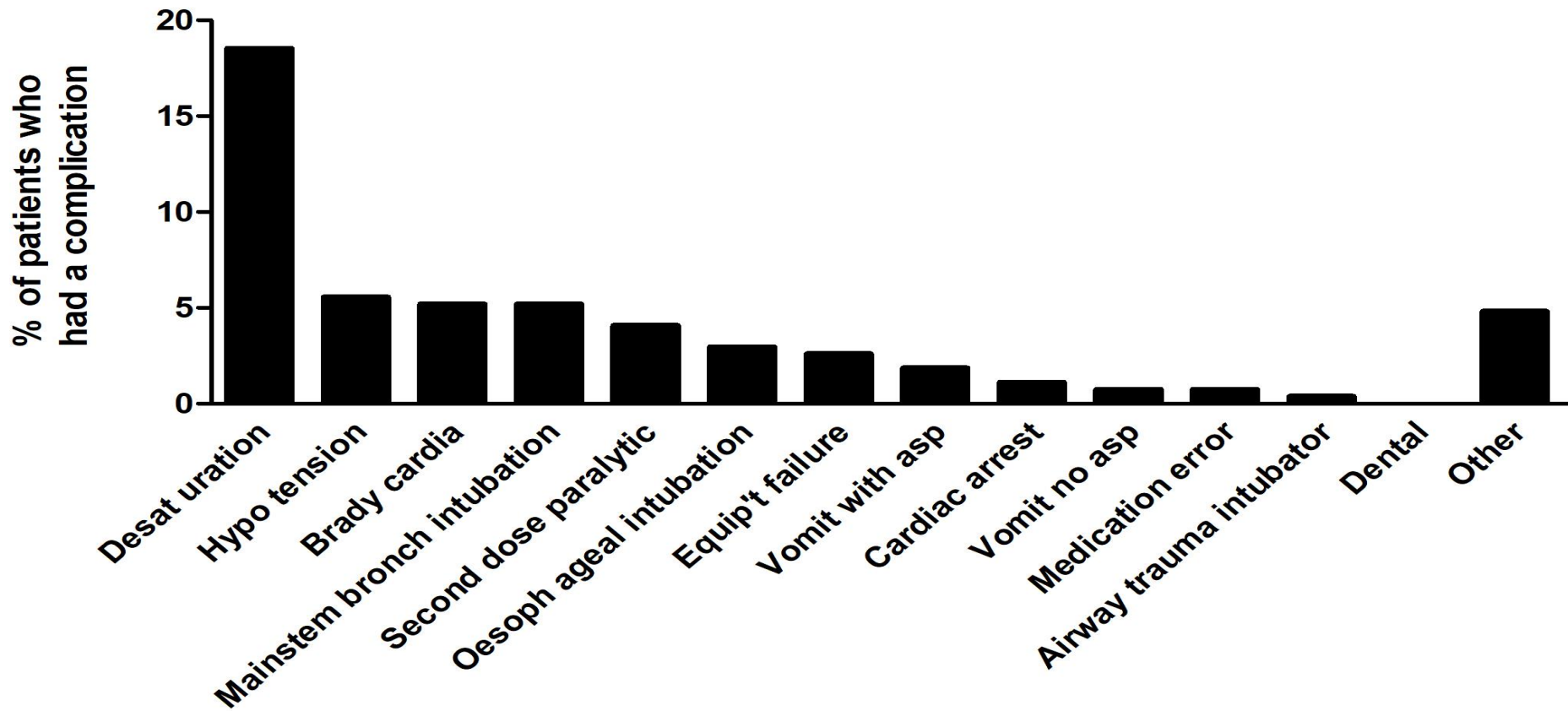
Number of Attempts until Intubation Success



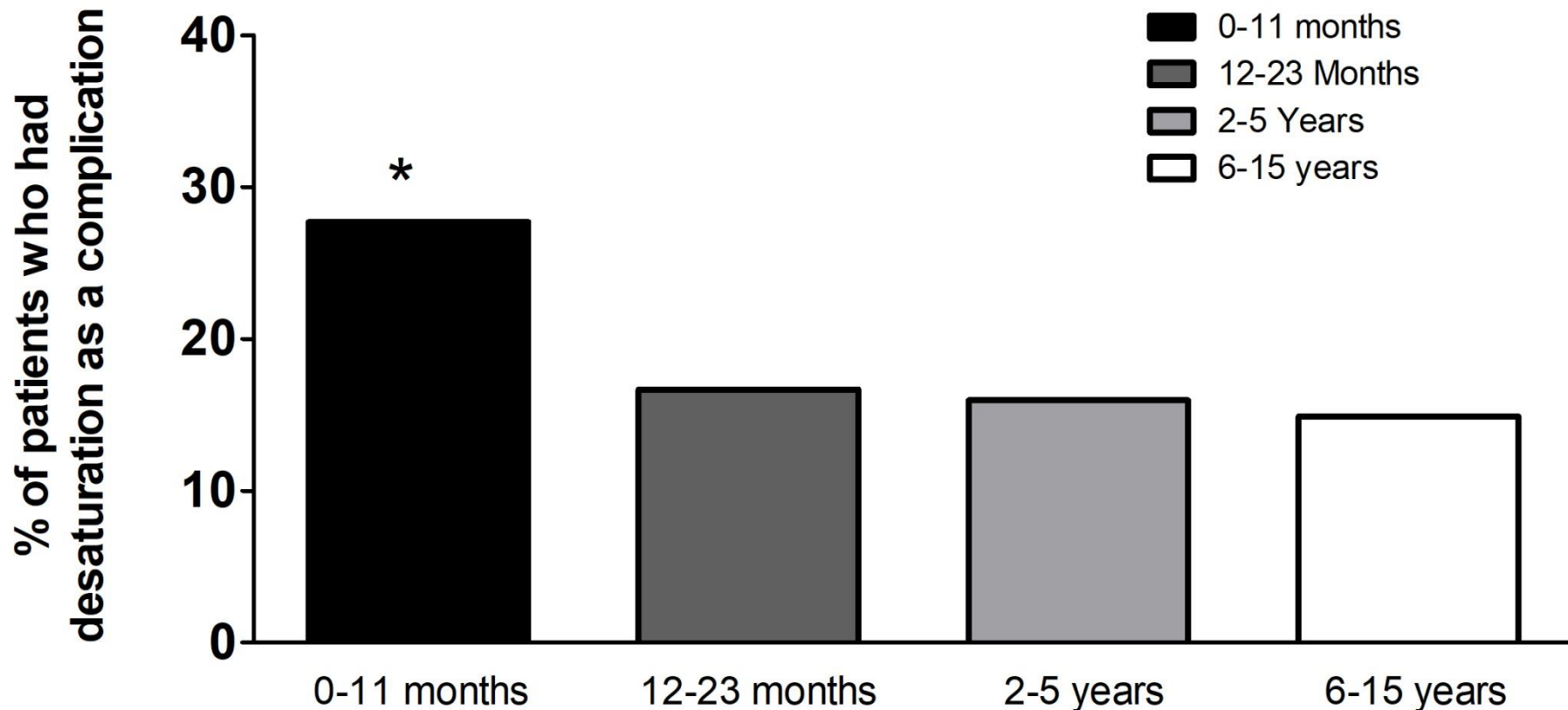
First Pass Success % by Age



Complications

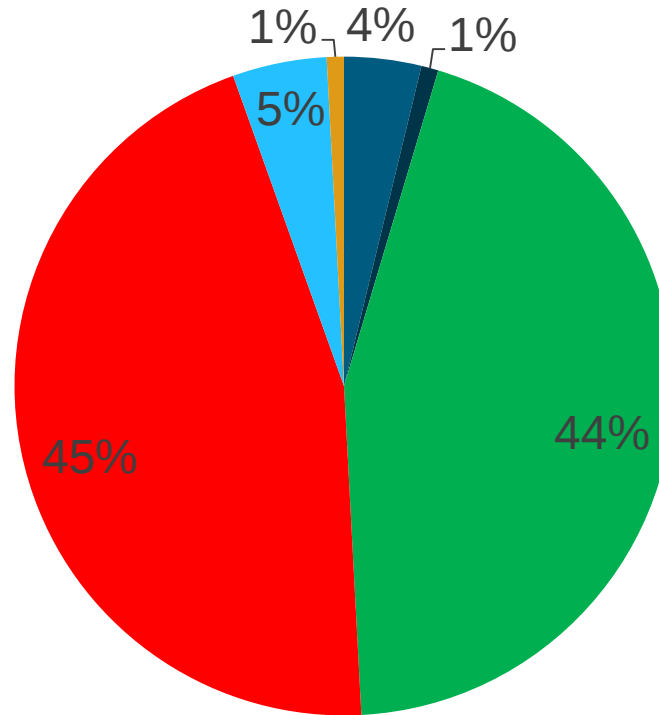


Desaturation by Age



Disposition as % of cohort (n=238)

- Died in ED
- Extubated in ED
- ICU
- Tranferred
- Theatre
- Reintubated in ED



Variables	n (%)	FPS (%)	Adjusted Odds Ratio (95% CI)	P value
Male	160 (59.3)	78.8	1	-
Female	110 (40.7)	81.8	1.56 (0.55-4.44)	0.41
ACEM role delineation				
Level 4/ major referral	200 (74.1)	82.0	1.36 (0.22-8.32)	0.74
Level 3/ urban district	37 (13.7)	75.7	4.34 (0.99- 19.08)	0.52
Level 2/ rural/regional	33 (12.2)	72.7	1	
No Medications	35 (13.0)	77.1	1	-
Induction agent / muscle relaxant only	16 (5.9)	80.8	0.25 (0.03-2.18)	0.21
Standard RSI	219 (81.1)	75.0	0.44 (0.03-2.32)	0.26
Laryngoscope				
Macintosh	126 (52.1)	77.9	1	
Video	62 (25.6)	91.9	8.29 (1.34-51.19)	0.02
Miller	42 (17.4)	61.9	0.61 (0.17-2.21)	0.45
Adjuncts				
None	139 (54.1)	80.6	1	
Bougie	56 (21.8)	83.9	2.23 (0.450-10.02)	0.30
Stylet	62 (24.1)	79.0	0.70 (0.20.- 2.41)	0.57
Airway Assessment Conducted				
No	114 (48.1)	77.2	1	
Yes	123 (51.9)	82.9	3.36 (1.13-9.95)	.029
Team Leader specialty				
Emergency	234 (87.6)	80.8	6.14 (1.39 – 27.21)	.017
Other	33 (12.4)	72.7	1	
Intubator Experience				
0-99 intubations	99 (37.9)	77.8	1	
>100 intubations	162 (62.1)	82.7	2.90 (1.04-8.1)	.042
Cricoid pressure				
None	196 (76.6)	78.6	1	
Pressure applied	98 (36.8)	86.7	10.92 (1.46 – 81.48)	.02
Difficult airway				
No	168 (70.9)	82.1	2.68 (0.88-8.163)	.08
Yes	69 (29.1)	69.6	1	
Cormack and Lehane grade‡				
I-II (Good view)	217 (88.6)	86.6	10.07 (2.05-49.39)	.004
III- IV	28 (11.4)	32.1	1	



- Clinician self report
- Non representative Sample of Australasian EDs
- Generic data collection tool
- Lack of outcome data beyond ED episode

- New research questions
 - ?Role of Cricoid Pressure in ED Paediatric Intubation
 - ?Impact and availability of VL for ED Paediatric Intubation
 - ?Optimal Skill Maintenance Programs for Individuals and Teams

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- ANZEDAR Author Group

- ACI

- ANZEDAR Participant EDs

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