

INTRODUCTION

- Capillary refill time (CRT) is defined as the time taken for a distal capillary bed to regain colour after pressure is applied to cause blanching
- Incorporated into advanced life support guidelines, CRT is part of the rapid and structured cardiopulmonary assessment of critically ill patients¹
- CRT is the best individual sign in the diagnosis of 5% dehydration in children² and is a 'red flag' for serious infection in both developed and developing countries^{3,4}
- There is currently no consensus as to the optimal site or method of measuring CRT
- Studies have shown poor intra- and inter-observer repeatability for CRT measurement^{5,6}



METHODS

Subject Recruitment

- Ethical institutional board approval, parental written informed consent
- ASA I-II children aged between 1 and 5 years, undergoing elective surgery under general anaesthesia
- Exclusion criteria include cardio-respiratory, peripheral vascular or autonomic nervous system disease, Raynaud's phenomenon, juvenile scleroderma, or upper limb surgery

CRT Measurement

- Staff anaesthetist measured the subject's CRT on the index finger and the chest to 0.5 second accuracy, according to his/her 'usual practice'
- Two trained observers each measured CRT on the subject's index finger and chest in a standardized manner:

- The subject's hand was elevated to just above heart level
- Pressure was applied to the pulp of the distal phalanx of the index finger so there was blanching of the capillary bed for 5 seconds
- The time to return of original colour (CRT) was measured using a digital stopwatch

RESULTS

- Data are reported from 25 children recruited thus far

Table 1. Subject demographics

	Age (years)*	Sex (M/ F)	Weight (kg)*
Subjects (n = 25)	3.4 (1.3, 1.13 - 5.52)	18/7	14.4 (2.7, 8.5 - 19.0)

*mean (SD, range)

Table 2. Summary of CRT measurements

		Observers	Anaesthetist
Index finger	CRT (seconds)*	0.88 (0.17)	1.0 (0.55)
	Range†	0.35 - 2.08	0.5 - 2.0
Chest	CRT (seconds)*	1.61 (0.35)	2.0 (0.71)
	Range†	0.42 - 3.14	0.5 - 3.5

*mean (SD); †range of all measurements

Table 3. Comparison of CRT measurements on the index finger and chest for trained observers and anaesthetists

	Observers	Anaesthetist
Difference (seconds)*	-0.002 (0.135)	-0.935 (0.679)
P-value	0.935	< 0.05
95% CI	-0.060; 0.053	-1.229; -0.641

*mean (SD)

RESULTS

Index Finger Measurements

- Overall intra-observer repeatability was 0.60 seconds

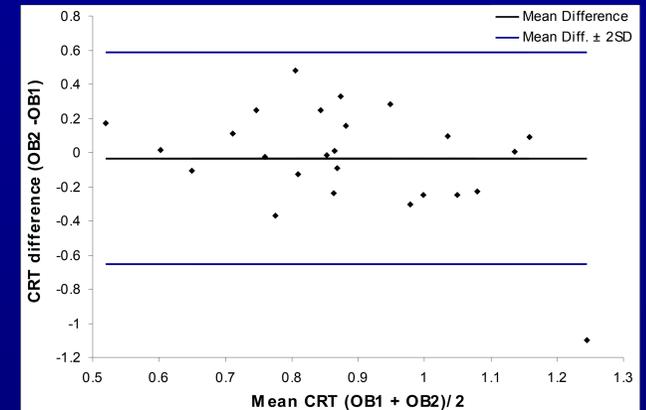


Figure 1. Bland-Altman agreement plot between trained observers' measurement of CRT

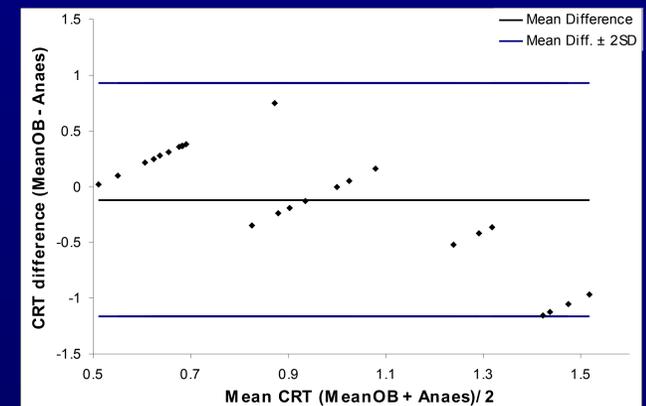


Figure 2. Bland-Altman agreement plot between trained observers' and anaesthetists' measurement of CRT

Chest Measurements

- Overall intra-observer repeatability was 0.82 seconds
- Limits of agreement when comparing observers 1 and 2 (-0.65 to 1.54) and the mean of the observers with the anaesthetists' (-1.67 to 1.0) were wider than the finger measurements

CONCLUSIONS

- There is **poor agreement** between anaesthetists' and trained observers' measurements of CRT
- There is **acceptable intra- and inter-observer repeatability** when trained observers use a standardized technique and stopwatch to measure CRT on the pulp of the index finger
- CRT measurement on the chest is difficult and unreliable
- Departmental research to assess CRT using plethysmography is currently ongoing

REFERENCES

- PALS Provider Manual: American Heart Association, 2002.
- JAMA 2004;291(22):2746-54.
- Lancet 2010;375(9717):834-45.
- Lancet 2008;371(9607):135-42.
- The Foot 2007;17(1):15-20.
- Hong Kong Journal of Emergency Medicine 2008;15(2):71-74.

OBJECTIVES

To assess:

- Intra-observer repeatability of CRT (index finger and chest) measurement by trained observers using a standardized technique
- Agreement between these observers (inter-observer repeatability)
- Agreement between CRT measured in a standardized way with 'usual practice' of staff anaesthetists

STATISTICS

- Intra-observer repeatability is expressed as the repeatability coefficient, which describes the maximum difference likely to occur between two successive measurements
- Inter-observer repeatability of CRT was assessed using the Bland-Altman method
- Paired t-tests were used to assess differences in the CRT measured on the finger and the chest