

# The Sydney paediatric trauma system and the effect of the discontinuation of the HIRT case identification process

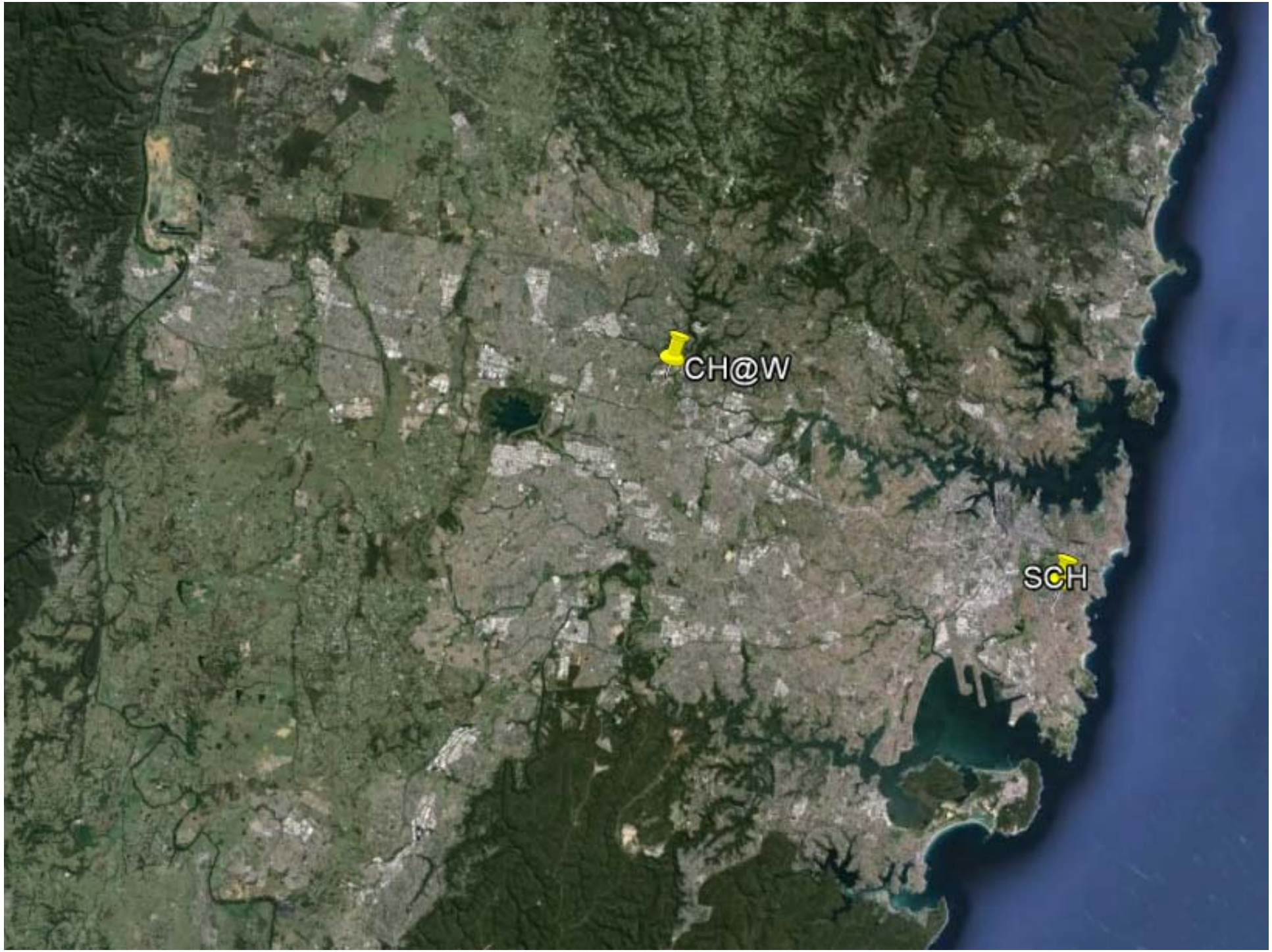


Alan Garner  
CareFlight

20<sup>th</sup> Aug 2015

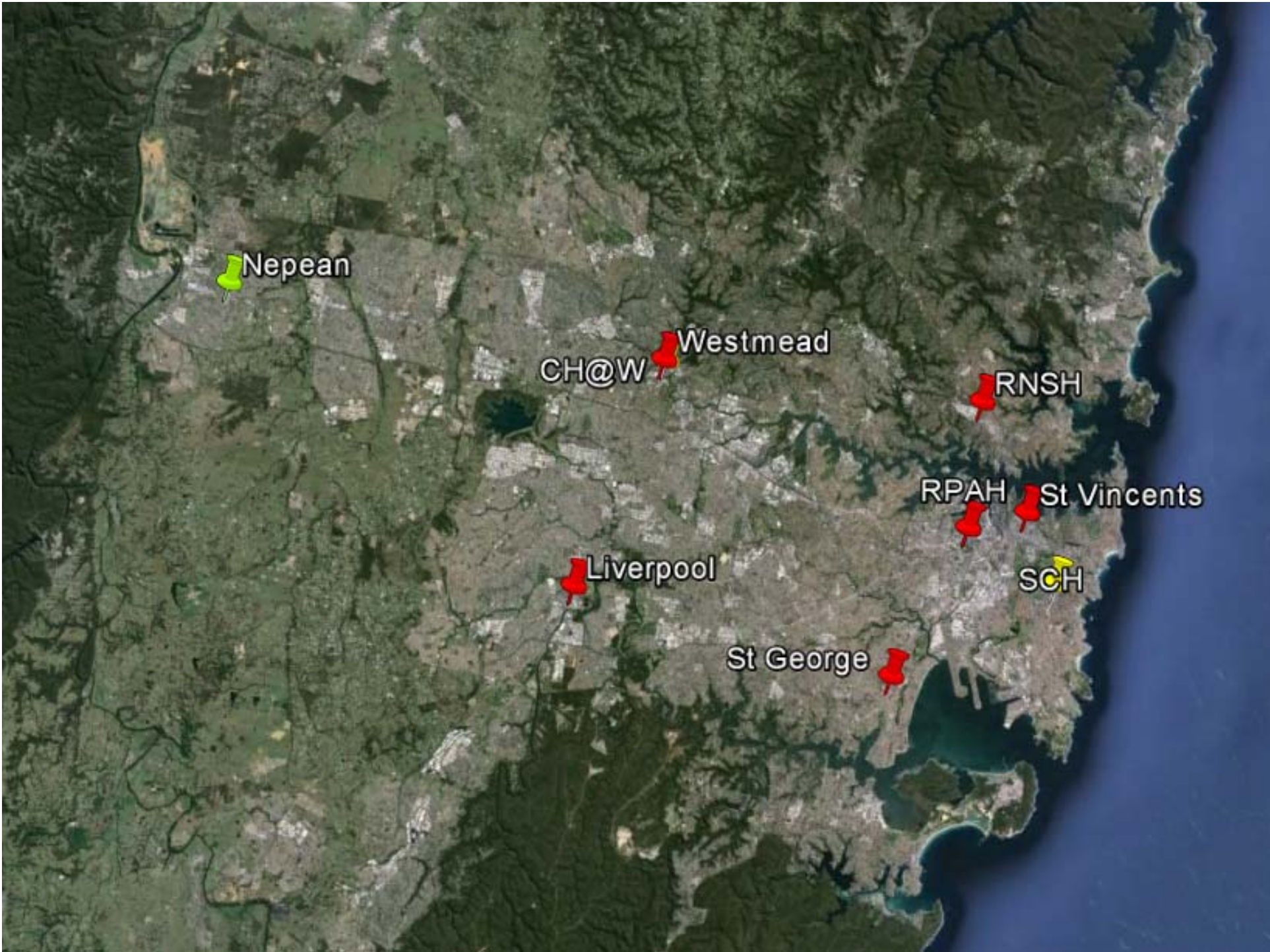
**CareFlight**





CH@W

SCH



Nepean

CH@W Westmead

RNSH

RPAH St Vincents

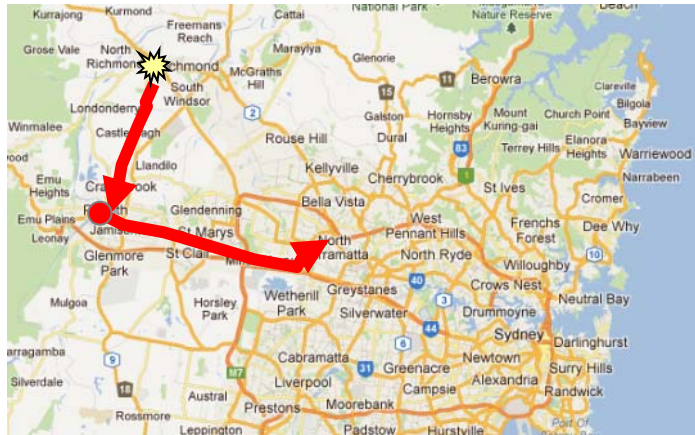
SCH

Liverpool

St George

# The Sydney paediatric trauma system

## Background

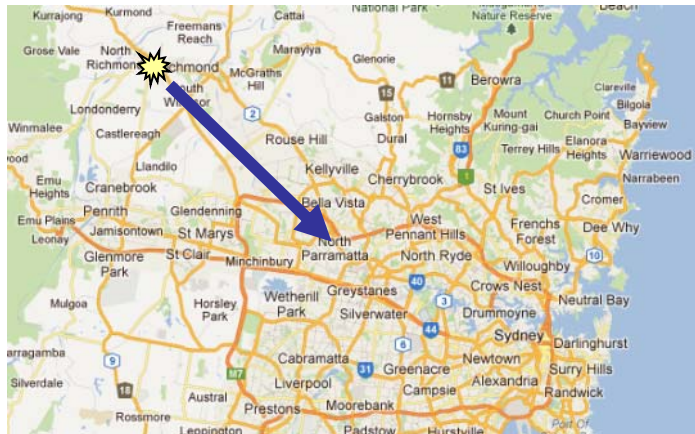


## Background

- Two thirds of severely injured children in Sydney went to an adult trauma hospital before transfer to a children's hospital
- Children receiving definitive care in an adult trauma centre were three times more likely to die\*

# Head Injury Retrieval Trial (HIRT) and paediatric trauma response

HIRT commenced operations in May 2005



## HIRT system

- At the request of the funding insurance company, the HIRT system responded to all children likely to have severe head injuries from the beginning of the trial
- From 2008 HIRT responded to all severely injured & drowned children

# Advent of the Rapid Launch Trauma Coordinator

NSW Ambulance partially replicated the trial case identification system and began tasking their physician staffed medical teams to the same cases from the end of 2007

NSW Ambulance management stated that:

- They believed that there was already sufficient evidence to mandate physician prehospital care as routine for severely injured patients
- They had a duty of care to dispatch physicians and the area in which the trial operated could not be exempted

Note: the 2013 NSW Reform Plan for Rotor Wing Retrieval Services endorsed physician prehospital care as the standard and it has since been introduced on all NSW HEMS services for prehospital response.



# Parallel dispatch systems for children

## HIRT

A member of the crew continuously monitored a web based link (Visinet) to the ASNSW CAD system.

## RLTC

A paramedic based at the MRU continuously monitored the same screens

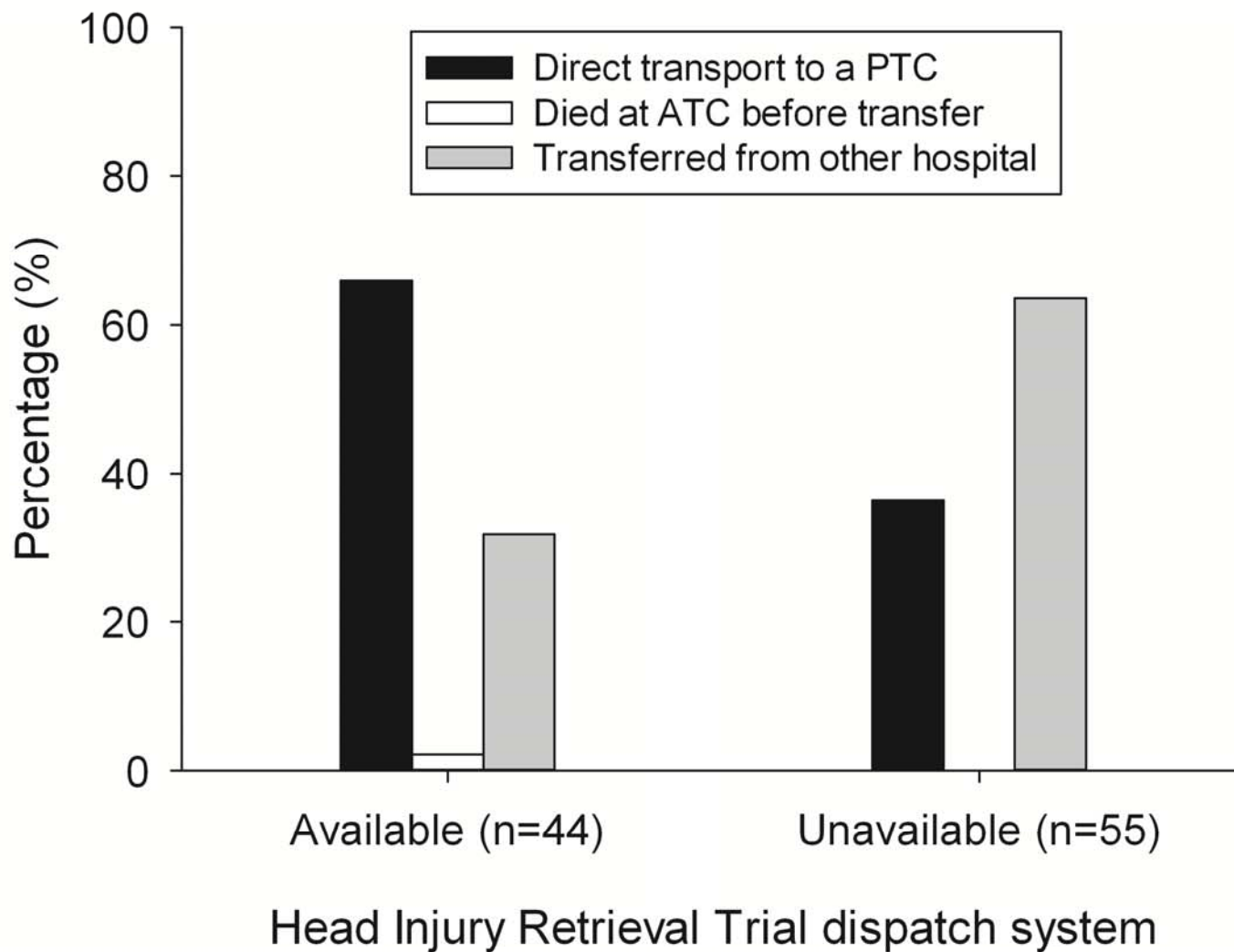
**When either dispatch system identified an appropriate paediatric case they immediately notified the other and HIRT was dispatched.**

## Natural experiment

Both systems were looking for the same cases in parallel to each other

Provided a unique opportunity to directly compare two tasking systems



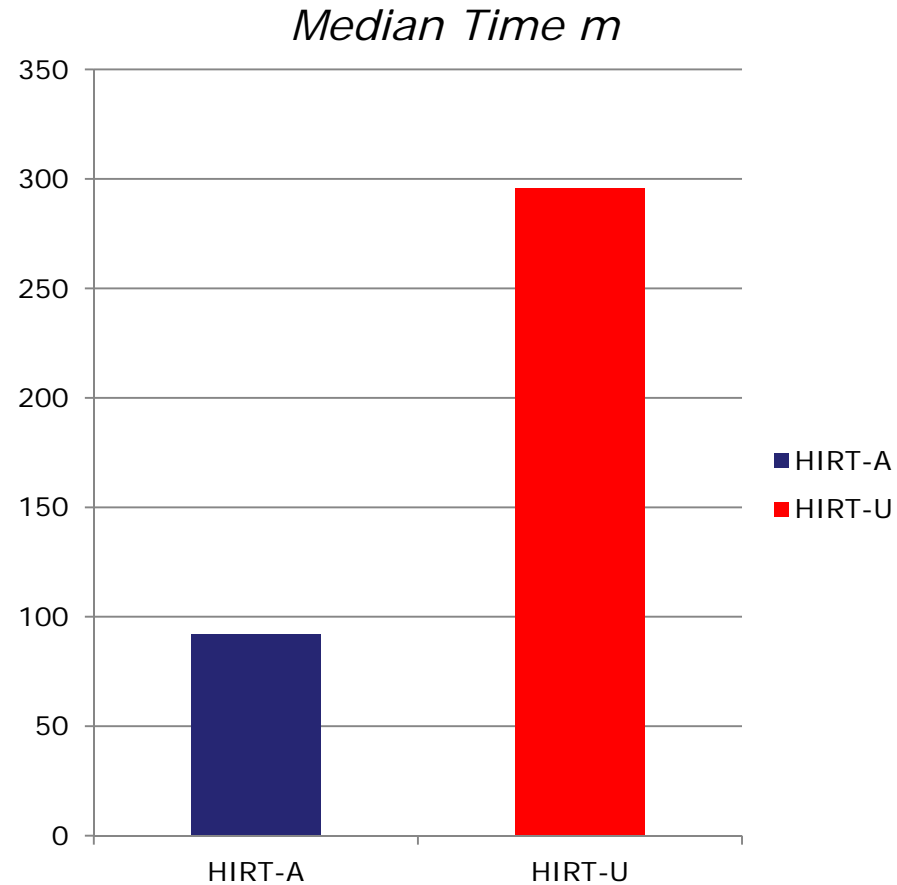


Direct transport to a PTC was more likely to occur when the HIRT system was available than when it was not available (RR 1.81, 95% CI 1.20-2.73)



# HIRT available versus unavailable

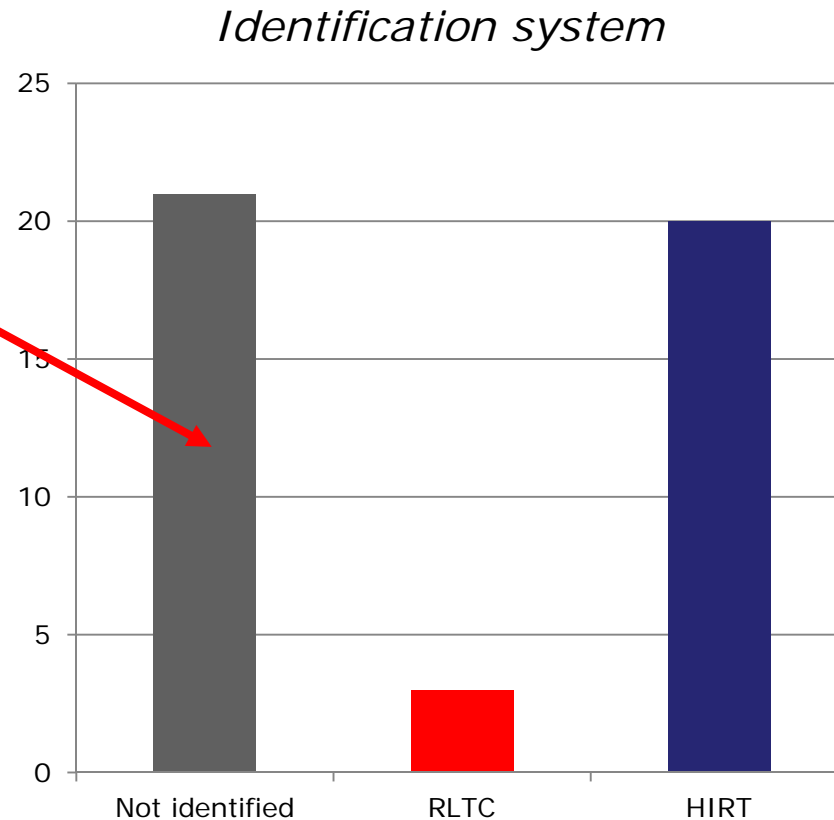
Excluding the child who died at the ATC before transfer, the median time (minutes) to arrival at the PTC was significantly shorter ( $P < 0.01$ ) when the HIRT system was available (92, IQR 50-261) than when the HIRT system was unavailable (296, IQR 84-583).



# Identification system

Of the 44 cases occurring during the HIRT available periods, 21 were not identified for physician team response, 3 were identified by the RLTC and 20 were identified by the HIRT system, ( $P < 0.001$  for the observed proportions if it is assumed that both dispatch systems are equally effective at identifying severe trauma cases).

There were no deaths among the children that were not identified by the HIRT dispatch system.



## Conclusion for study 1

The HIRT system had significantly greater sensitivity than the RLTC and did not miss any cases where the child was severely injured enough to die.

When HIRT was available two thirds of severely injured patients went directly to a PTC. When HIRT was unavailable this number reverted to the historic norm.

Patients arrived at a PTC a median of 3.5 hours faster when HIRT was available.

Garner A et al. Physician staffed helicopter emergency medical service dispatch via centralised control or directly by crew - case identification rates and effect on the Sydney paediatric trauma system. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2012; 20: 82.



What could go wrong?



## Cessation of enrolment in HIRT – March 2011

**The HIRT dispatch process was discontinued by the NSW Ambulance at cessation of randomisation in March 2011**

- Access to the CAD screens by CareFlight was withdrawn by Ambulance
- All tasking since then has been by the RLTC only

***Noooooo!***



## Study 2: (HIRT and RLTC in parallel) vs (RLTC alone)

### Objective

Compare the accuracy of the parallel HIRT and RLTC case identification system used prior to March 2011 with the RLTC operating in isolation since then.

### Design

Retrospective, registry based comparison

### Inclusion criteria

Cases were abstracted from the ITIM Statewide trauma registry if they met the following inclusion criteria:

- Age < 16 years.
- Incidents within the Sydney coordination area of the NSW Ambulance.
- Injury Severity Score (ISS) > 15
- Incident notification occurred via 000
- Incidents occurred between 24<sup>th</sup> May 2008 and 13<sup>th</sup> March 2011 (period 1; 33 months) or 14<sup>th</sup> March 2011 and 30<sup>th</sup> September 2014 (period 2; 54 months)

## Differences between the time periods

No other system changes occurred between the two time periods.

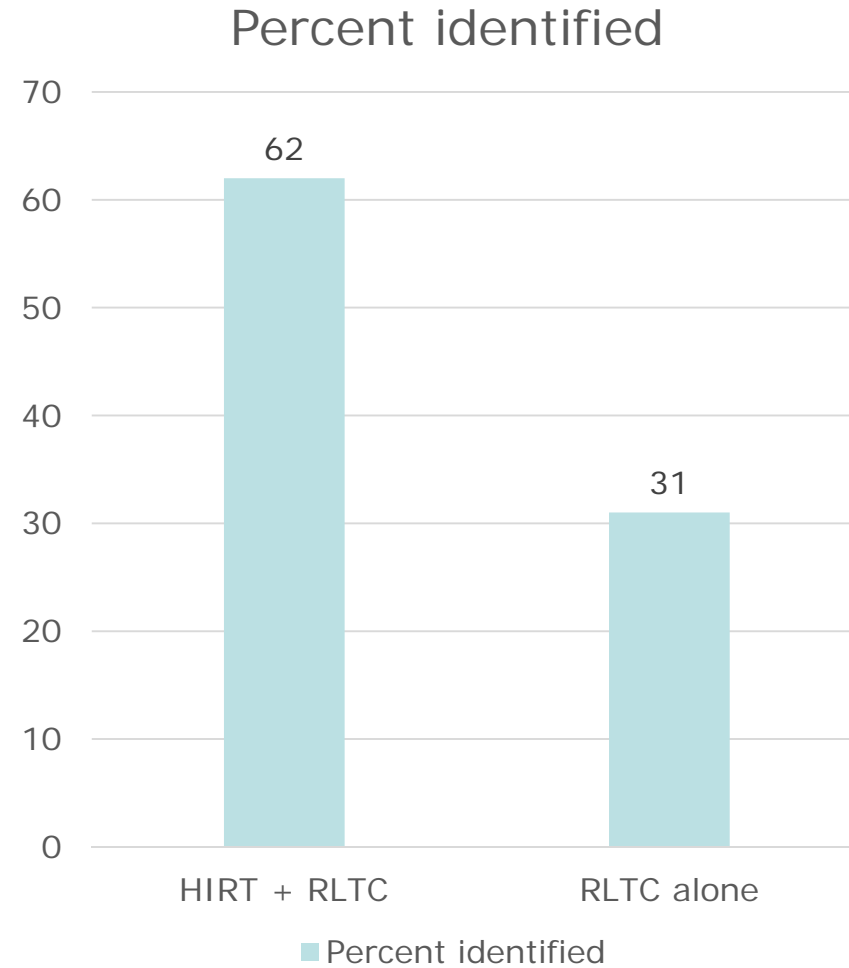
Only times when the CareFlight (HIRT) helicopter was available to be tasked were considered to ensure that system configuration was the same between periods.



	<b><i>HIRT + RLTC (n=71)</i></b>	<b><i>RLTC alone (n=126)</i></b>	<b><i>P value</i></b>
Median (IQR) age, years	6 (2-12)	8 (3-13)	0.232
Median (IQR) ISS	22 (17-25)	25 (19-29)	0.012
Mechanism of injury (n, %)			0.206
Drowning	12 (16.9)	15 (11.9)	
Fall	20 (28.2)	42 (33.3)	
MVA	6 (8.5)	6 (4.8)	
MBA	1 (1.4)	10 (7.9)	
Pedal cyclist	3 (4.2)	5 (4.0)	
Pedestrian	14 (19.7)	28 (22.2)	
Hanging/suffocation	2 (2.8)	8 (6.3)	
Other	13 (18.3)	12 (9.5)	
ICU admission (n, %)	44 (62.0)	76 (60.3)	0.819
Median (IQR) ICU LOS, days	1 (0-6)	1 (0-3)	0.357
Median (IQR) hospital LOS, days	7 (1-15)	6 (2-19)	0.657



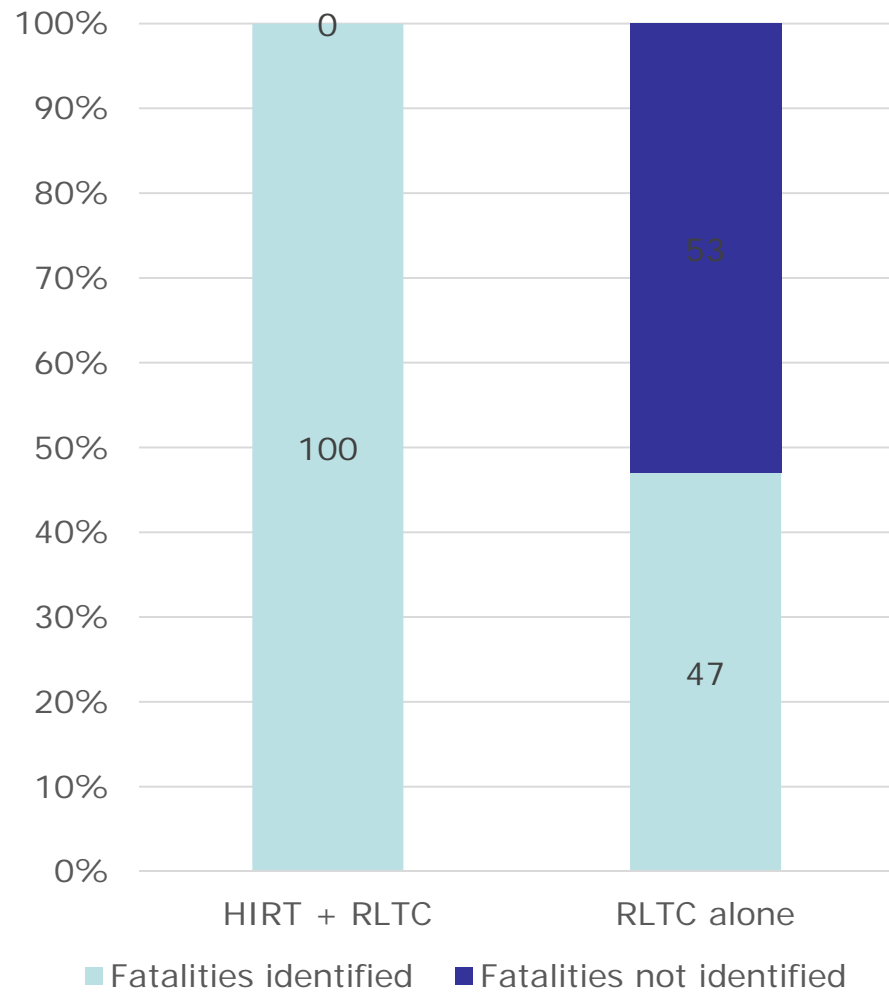
# Percentage of cases identified for physician response



P < 0.001

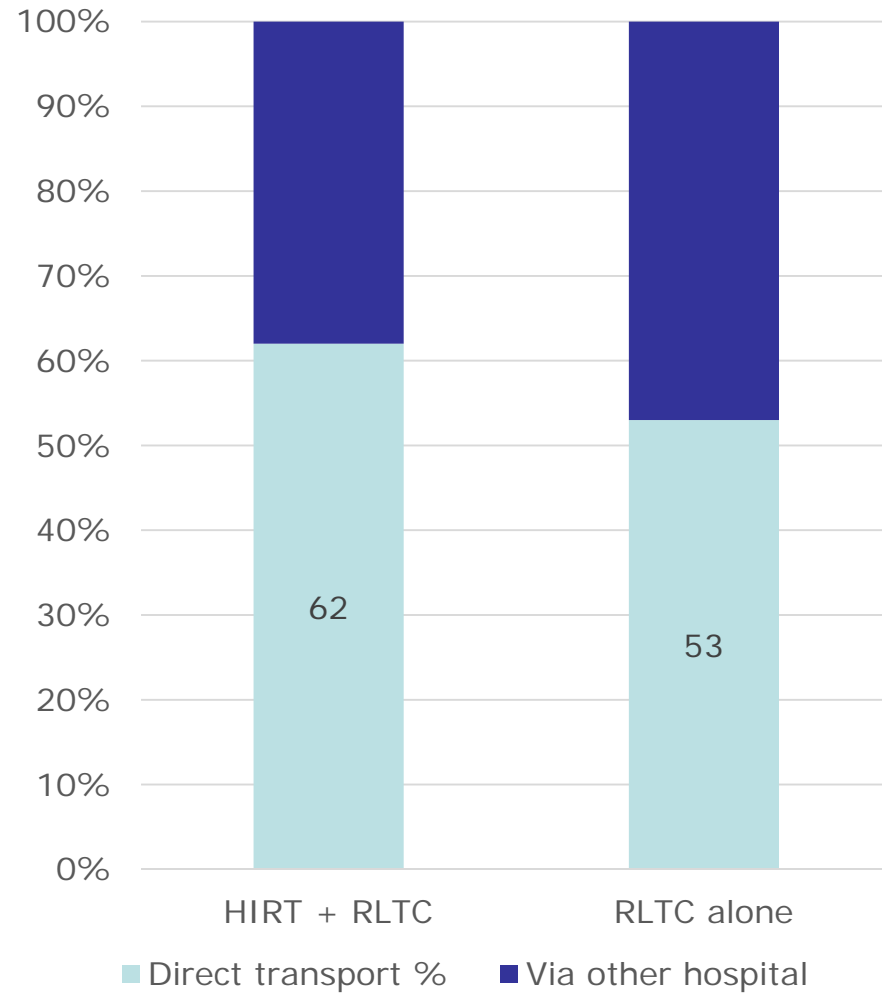
# Percentage of fatal cases not identified

P < 0.001



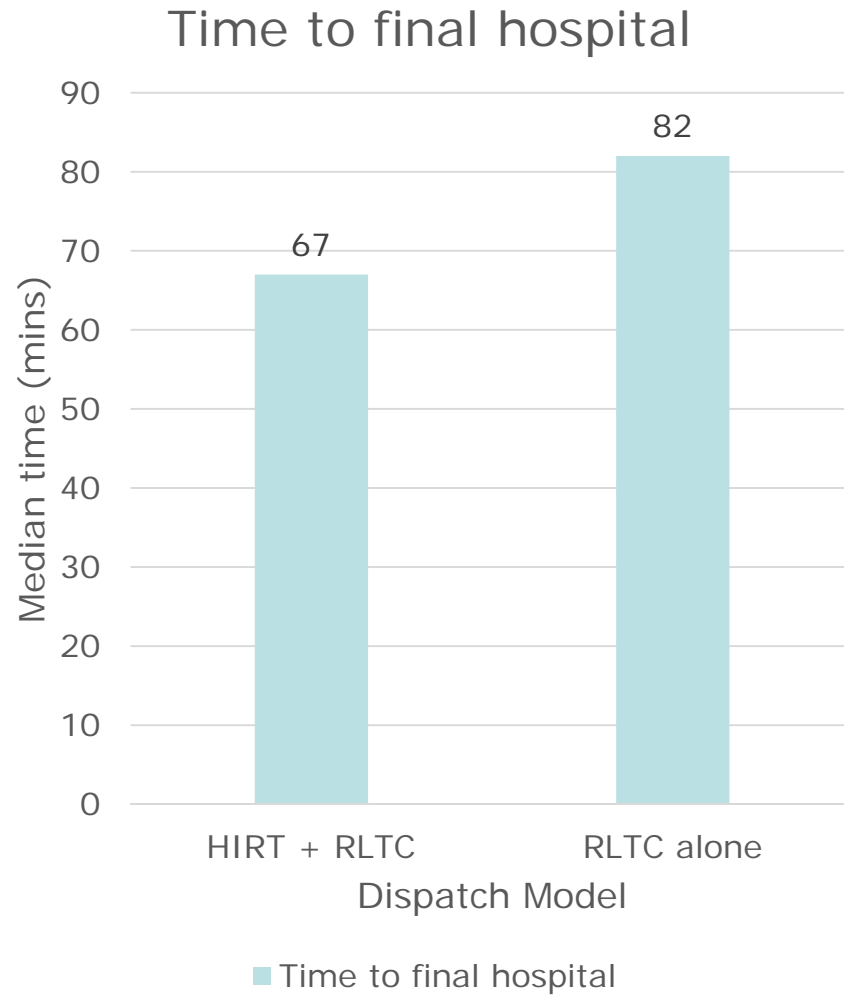
# Percentage with direct transport to paediatric trauma centre

P = 0.076



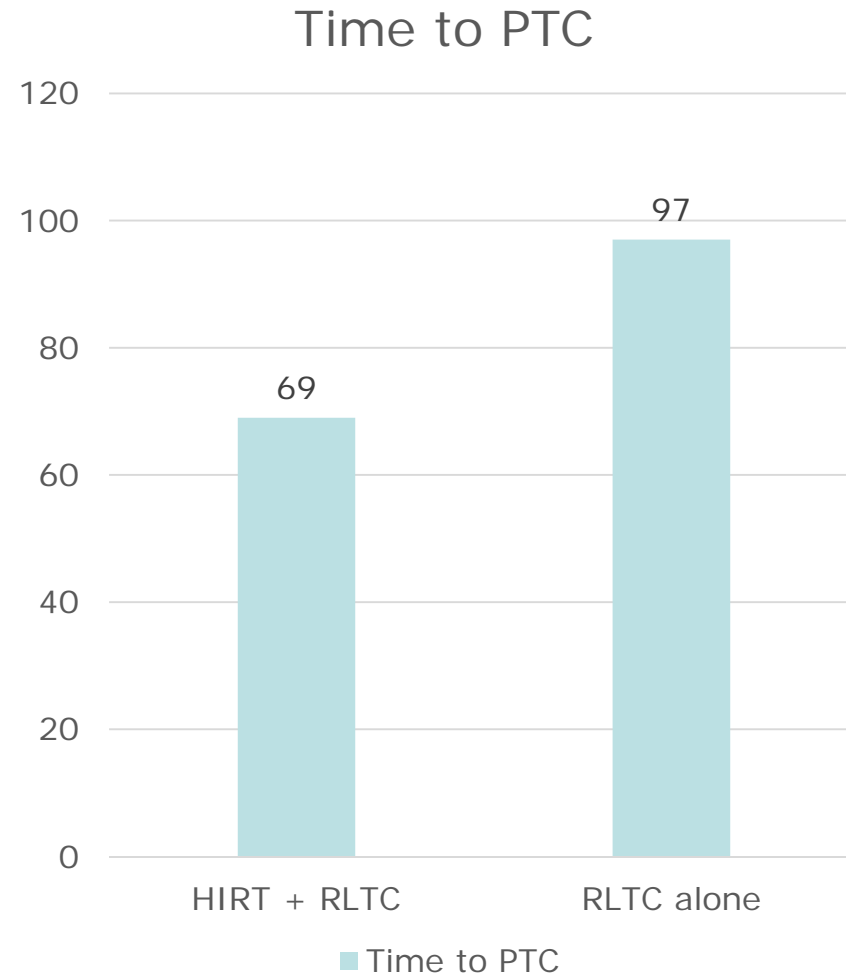
# Median time to final hospital (mins)

P = 0.034

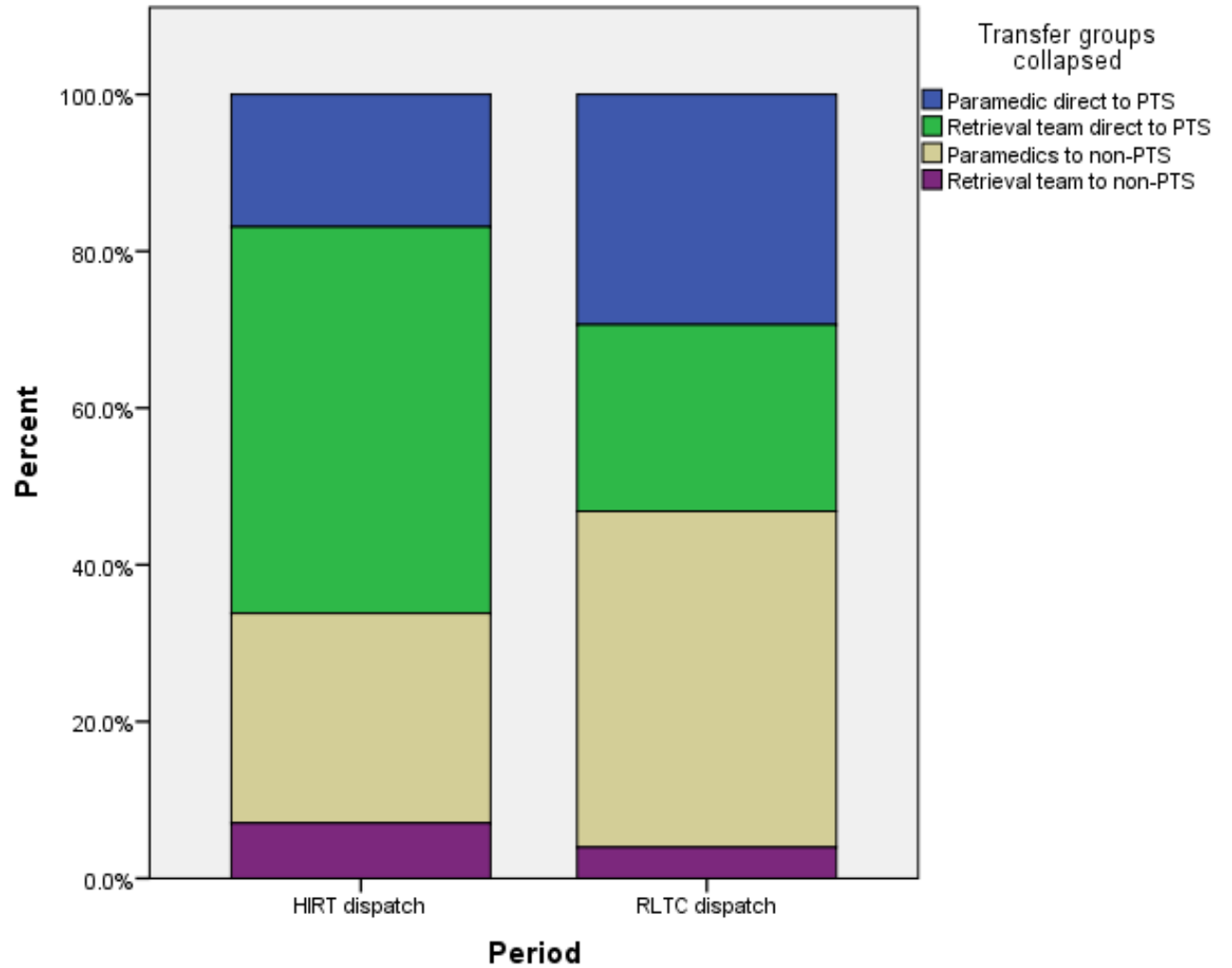


# Median time to reach paediatric trauma service (mins)

P = 0.003

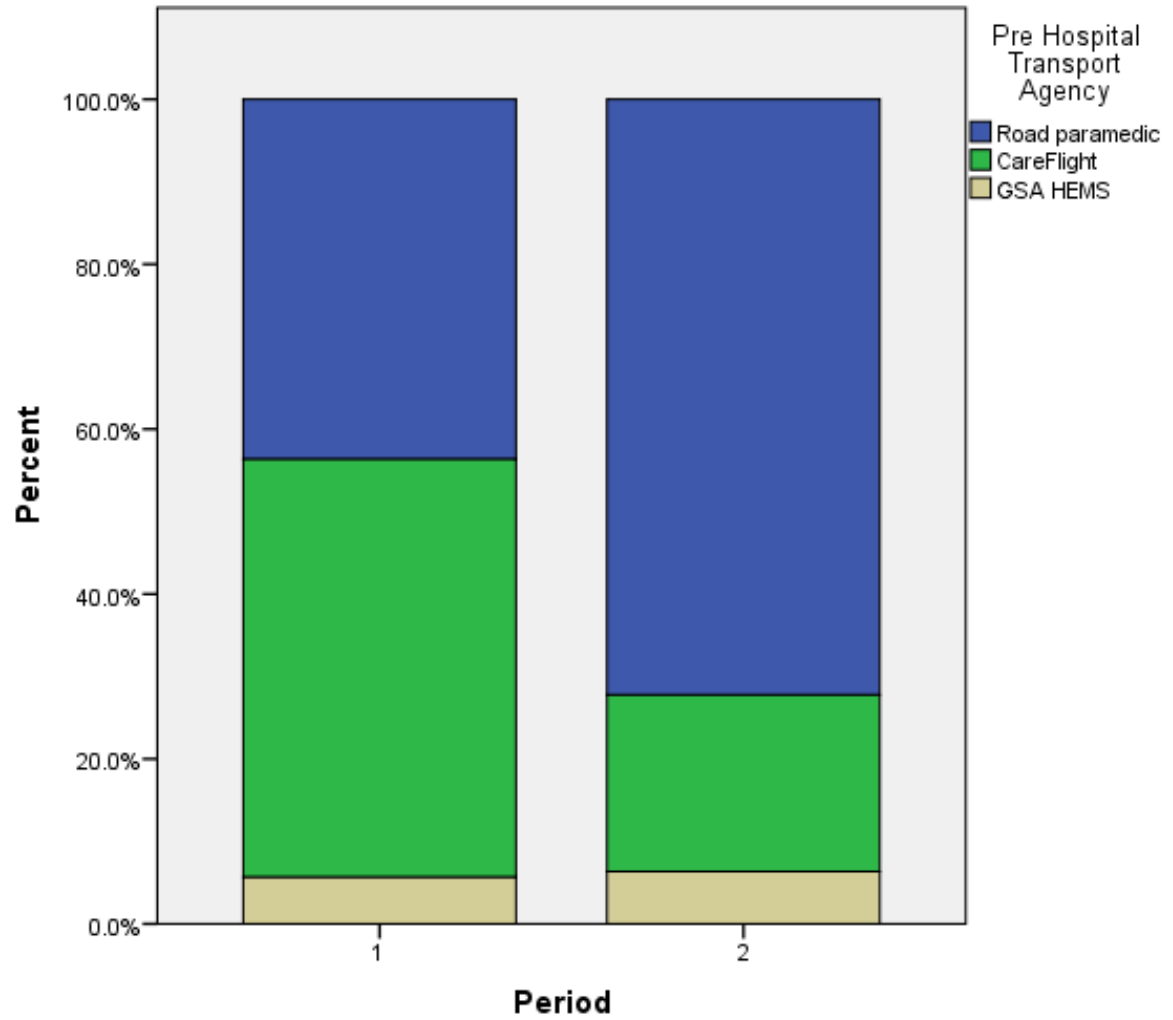


# Transporting team and destination (%)



P < 0.001

# Treating prehospital team (%)



P < 0.001

## Limitations

- Registry data; prospectively collected but not for this purpose
- Before and after design; factors unknown to us may have changed



## Conclusions

Physician response to severe trauma patients in NSW is system policy and accepted standard of care. However, since cessation of HIRT when the trial dispatch system was discontinued:

- For severely injured children in the Sydney region, the rate of physician prehospital care has halved
- Time to arrive at the final hospital and at a Paediatric Trauma Centre has significantly increased
- More than half of children who are severely injured enough to die do not now have a physician response activated, whereas all fatalities had a physician response when the HIRT system was operational

# Editorial comment

