Table A: Major findings of the initial systematic review[5]

	Main findings
Methodology	NHS Centre for Reviews and Dissemination guidance on systematic reviews of interventions and clinical tests in healthcare[78]
Search strategy	Database search: CINAHL, Cochrane Library, Database of Reviews of Effectiveness, EMBASE and Medline from January 1990 to February 2009. Hand searching of reference lists and citation search of papers identified by database searching. Correspondence with experts and lead authors.
Search results	Eleven papers[22,26,32,36,37,48,51,59,61,63,79] describing 10 systems
General characteristics	Marked variability across all aspects including the method of development, type of system, and the number and type of parameters.
Validity	Five studies[22,26,36,51,59] explored the predictive validity, but only three[26,51,59] used appropriate methodology and analysis.
Clinical effectiveness	Only one study evaluated the effective of implementing a PTTS.[51] However five papers reported the effect of a rapid response team activated by a PTTS[32,36,37,61,63] of which two[37,63] reported statistically significant improvements in hospital wide mortality, code rates and 'preventable' cardiopulmonary arrest.
Reliability	One study evaluated reliability,[51] which was found to be high.
Utility	No studies evaluated utility.
Implications for practice	The lack of evidence on PTTS raises concerns about widespread adoption without more research. Hospitals with an track and trigger system should monitor and modify their system. Hospitals considering introducing a PTTS should consider systems that meet their local needs and patient population.
Implications for research	Further studies on validity, reliability and clinical utility and the impact of PTTS on patient outcomes are needed. Age-related thresholds for vital signs and their role in identifying physiological instability warrant further investigation.
Conclusion	The role of PTTS in aiding early detection of critical deterioration in hospitalised children has not, as yet, been demonstrated.

Supplemental data B: Database search results

AMED: 27th May 2016

Search number	Search term	Search field	Result
1	Intensive Care Unit	Explode	0
2	Intensive Care	Explode	149
3	Critical illness	Explode	74
4	Emergency service, hospital	Explode	0
5	Emergency Medical Services	Explode	272
6	Acute disease	Explode	1747
7	"track"	Map term	484
8	"trigger"	Map term	682
9	7 and 8		1
10	1 or 2 or 3 or 4 or 5 or 6		2204
11	"rapid response"	Map term	25
12	Early warning	Map term	17
13	9 or 11 or 12		43
14	10 and 13		1
15	Limit 14 to "child" subjects		0
16	Limit 15 to 1990 – 2015.(sa_year)		0

CINAHL Plus: 27th May 2016

Search number	Search term	Search field	Result
1	"early warning"	Abstract	686
2	"rapid response'	Abstract	1206
3	medical emergency team"	Abstract	224
4	"critical care outreach"	Abstract	66
5	"track"	Abstract	4873
6	"trigger"	Abstract	6874
7	5 and 6	All	43
8	1 or 2 or 3 or 4 or 7, limit to all infant/child/adolescent and dates: 1990 - 2015	All	208

Cochrane: 27th May 2016

Search number	Search term	Search field	Result
1	"early warning"	Title, abstract, key words	146
2	"track and trigger"	Title, abstract and key words	7
3	"rapid response"	Title, abstract and key words	248
4	"critical care outreach"	Title, abstract and key words	7
5	"medical emergency team"	Title, abstract and key words	18
6	child	Title, abstract and key words	87890
7	1 or 2 or 3 or 4 or 5		409
8	6 and 7, limit to 1990-present		61

Embase: 27th May 2016

Search number	Search term	Search field	Result
1	Intensive Care Unit	Explode	107477
2	Intensive Care	Explode	544019
3	Critical illness	Explode	23988
4	Emergency service, hospital	Explode	77948
5	Emergency Medical Services	Explode	77948
6	Acute disease	Explode	94473
7	"track"	Map term	45384
8	"trigger"	Map term	86632
9	7 and 8		313
10	1 or 2 or 3 or 4 or 5 or 6		774492
11	"rapid response"	Map term	6127
12	Early warning	Map term	5166
13	9 or 11 or 12		11328
14	10 and 13		2407
15	Limit 14 to "child" subjects		210
16	Limit 15 to 1990 – 2015.(sa_year)		201

OVID Medline: 27th May 2016

Search number	Search term	Search field	Result
1	Intensive Care Unit	Explode	63429
2	Intensive Care	Explode	47573
3	Critical illness	Explode	20013
4	Emergency service, hospital	Explode	56973
5	Emergency Medical Services	Explode	107287
6	Acute disease	Explode	195927
7	"track"	Map term	33896
8	"trigger"	Map term	65363
9	7 and 8		193
10	1 or 2 or 3 or 4 or 5 or 6		404346
11	"rapid response"	Map term	4224
12	Early warning	Map term	3683
13	9 or 11 or 12		7958
14	10 and 13		906
15	Limit 14 to "child" subjects		100
16	Limit 15 to 1990 – 2015.(sa_year)		94

Data Extraction Form: Observational Studies

Reference number:

Title:

Author(s)

Source

Date: Vol: Part: Pages:

Stated Purpose of paper:

Development/testing of PTTS ☐ Implementation of RRT/MET ☐

Other ☐

The Tool:

Name of PTTS:

Origin of PTTS:

Original ☐

Adapted from paed tool ☐ Adapted from adult tool ☐

Country of study _____

Type of PTTS: Scoring ☐ Trigger ☐

Comments:

Stated Purpose of EWS:

Screen for CA ☐ Screen for RA ☐ Screen for CRA ☐
Screen for unplanned ICU transfer ☐ Screen for death ☐
Screen for METS /RRT activation ☐
Details:

PTTS Age ranges: Overall age range_____ Number of ranges _____

1.	2.
3.	4.
5.	6.
7.	8.

Parameters included:

Obs	Description/ranges (Number if age ranges)
T	
HR	
SBP	
RR	
Conscious Level	AVPU ☐ GCS ☐ Other ☐
UOP	
SpO_2	
CRT	

** Subjective measure, Objective measure or mixed*

Concern/worry: Doctor ☐ Nurse ☐ Other ☐
Staff only ☐ Staff and parents ☐

Other parameters: Description/ranges (Number if age ranges)

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.

Comments:

Number of parameters:

Total in each age-specific tool_____

If age dependent tool:

Total independent of age_____ Total dependent on age_____

Overall total for all age ranges _____ (how many parameters to remember)

Response:

Single response ☐ Graded response ☐ Not stated ☐

Trigger thresholds:

Study characteristics:

Participants:

Setting: Children's hospital ☐ General hospital ☐

Methodology:

Data collection: Retrospective ☐ Prospective ☐

Allocation Concealment?

Eligibility criteria:

Inclusion criteria:	Exclusion criteria:

How, when and where measures were taken?

Outcomes assessed:

Control of confounding

Period of follow-up

Results:

When was the study done (dates):

Clinical & demographic patient characteristics (n):

Staff characteristics:

Key findings:

Patients not detected by PTTS

Discusses clinical applicability

Authors conclusions:

Reviewers Comments:

Generalisability of findings:

Other comments:

Data Extraction Form: Diagnostic studies

Reference number:

Title:

Author(s)

Source

Date: Vol: Part: Pages:

Stated Purpose of paper:

Development/testing of PTTS ☐ Implementation of RRT/MET ☐

Other ☐

The Tool:

Name of PTTS:

Origin of PTTS:

Original ☐

Adapted from paed tool ☐ Adapted from adult tool ☐

Country of study _____

Type of PTTS: Scoring ☐ Trigger ☐

Comments:

Stated Purpose of EWS:

Screen for CA ☐ Screen for RA ☐ Screen for CRA ☐
Screen for unplanned ICU transfer ☐ Screen for death ☐
Screen for METS /RRT activation ☐
Details:

PTTS Age ranges: Overall age range_____ Number of ranges _____

1.	2.
3.	4.
5.	6.
7.	8.

Parameters included:

Obs	Description/ranges (Number if age ranges)
T	
HR	
SBP	
RR	
Conscious Level	AVPU ☐ GCS ☐ Other ☐
UOP	
SpO_2	
CRT	

** Subjective measure, Objective measure or mixed*

Concern/worry: Doctor ☐ Nurse ☐ Other ☐
Staff only ☐ Staff and parents ☐

Other parameters: Description/ranges (Number if age ranges)

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.

Comments:

Number of parameters:

Total in each age-specific tool_____

If age dependent tool:

Total independent of age_____ Total dependent on age_____

Overall total for all age ranges _____ (how many parameters to remember)

Response:

Single response ☐ Graded response ☐ Not stated ☐

Trigger thresholds:

Study characteristics:

Methodology:

Participants:

Setting: Children's hospital ☐ General hospital ☐

Study population Control group ? Cohort ?

Eligibility criteria:

Inclusion criteria:	Exclusion criteria:

Recruitment

Sampling (Consecutive)?

Data collection: Retrospective ☐ Prospective ☐

Outcomes assessed:

Period of follow-up

Blinding of assessors?

Data analysis:

Describes methods of statistical analysis of diagnostic accuracy and uncertainity

Results:

Dates of study:

Clinical & demographic patient characteristics (n):

Staff characteristics:

Key findings:

AUROC Sensitivity Specificity

PPV NPV

Other:

Patients detected/not detected by PTTS:

Outcome	TP	FP
TN		
FN		

Outcome	TP	FP
TN		
FN		

Discusses clinical applicability

Authors conclusions:

Reviewers Comments:

Other comments:

Table D: Quality assessment of studies assessing diagnostic testing

STUDY	RISK OF BIAS				Overall risk of bias
	PATIENT SELECTION	INDEX TEST	REFERENCE STANDARD	FLOW AND TIMING	
Agulnik[28]	☹	☹	☺	☹	☹
Akre[55]	☹	☹	☹	☺	☹
Duncan[59]	☹	☹	☹	☹	☹
Edwards 2009[26]	☺	☺	☺	☺	☺
Edwards 2011[34]	☺	☺	☺	☺	☺
Fuijschot 2014[19]	☹	☹	☹	☹	☹
Gawronski[21]	☹	☹	☺	☹	☹
Haines[22]	☹	☹	☹	☹	☹
Mandell[30]	☹	☺	☺	☺	☹
Mason[46]	☺	☺	☺	☺	☺
McLellan[69]	☹	☹	☺	☺	☹
Olson[31]	☹	☹	☺	☹	☹
Parsharum 2009[14]	☹	☹	☺	☺	☹
Parsharum 2011[16]	☹	☺	☺	☺	☹
Robson[17]	☹	☹	☹	☺	☹
Skaletsky 2012[42]	☹	☹	☺	☺	☹
Tucker[51]	☺	☺	☺	☺	☹
Tume[23]	☹	☹	☺	☹	☹

☺ Low Risk ☹ High Risk ? Unclear Risk

Table E: Risk of bias for observational studies

Study	RISK OF BIAS					Overall Risk of Bias
	Lack of allocation concealment	Failure to develop and apply eligibility criteria	Flawed measurement of exposure and outcome	Inadequate control of confounding	Inadequate/ incomplete follow-up	
Anwar-ul-Haque[57]	☹	☺	☺	?	☺	☹
Bell[64]	☹	☹	?	☹	☺	☹
Bonafide[40]	☺	☺	☺	☺	☺	☺
Bonafide[18]	☺	☺	☺	☺	☺	☺
Brady[52]	☺	☺	☺	☺	☺	☺
Brilli[36]	☺	☺	☺	☺	?	☺
Demmel[54]	?	?	☹	☹	?	☹
Ennis[45]	☺	☹	☹	☹	?	☹
Hanson[66]	☺	☺	☺	?	☺	☺
Henderson[56]	☹	☹	☹	☹	☹	☹
Hunt[61]	☺	☺	☺	☺	☺	☺
Kinney[33]	☹	☹	☹	☺	☺	☹
Kotsakis[62]	☺	☺	☺	☺	☺	☺
Krmpotic[35]	☹	☹	☹	?	☺	☹
Lobos[39]	☹	☺	☹	☺	☺	☹
McKay[29]	☺	☹	☹	☺	☺	☹
McLellan 2014[24]	☺	☹	☺	☹	☹	☹
Monaghan[48]	?	☹	☹	☹	☹	☹
Panesar[60]	☹	☺	☹	☹	☺	☹
Parsharam 2011[15]	☺	☺	☺	☺	☺	☺
Rahman[25]	☺	☹	☹	☹	☺	☹
Randhawa[49]	☹	☹	☹	☹	☹	☹

Sefton[41]	☺	☺	☹	☺	☺	☹
Sharek[63]	☺	☺	☺	☺	☺	☺
Skaletzky 2009[58]	☹	☹	☹	☹	☹	☹
Tibballs 2005[32]	☹	☺	☹	☹	☺	☹
Tibballs 2009[37]	☹	☺	☹	☹	☺	☹
Van Voorhis[47]	☹	☹	☹	☹	☹	☹
Watson[50]	☹	?	☹	☹	☹	☹
Zenker[67]	☹	☺	☺	☹	☺	☹

Key: ☺Low Risk ☹High Risk ? Unclear Risk

Table F: PTTS providing additional guidance on 'normal' vital sign values

System	Age range	Heart Rate		Respiratory Rate
MPEWS I[42]		**Awake**	**Sleeping**	
	0-3m	85 - 205	80 - 160	
	3m-2y	100 - 190	75 - 160	
	2-10y	60 - 140	60 - 90	
	>10y	60 - 100	50 - 90	
	<1y			30 - 60
	1-3y			24 - 40
	4-5y			22 - 24
	6-12y			18 - 30
	13-18y			12 - 16
PEW score III[54]	Neonate	70 - 190		30 - 50
	1-11m	80 - 160		30 - 45
	1-2y	80 - 130		20 - 30
	3-4y	80 - 120		20 - 30
	5-7y	70 - 115		20 - 25
	8-11y	80 - 110		12 - 20
	12-15y male	80 - 100		12 - 20
	12-15y female	80 - 110		12 - 20
	>15y male	75 - 95		12 - 20
	>15y female	70 - 100		12 - 20
PEW score IV[55]	1-5 y	100 - 180		40 - 60
	5-12 y	100 - 180		35 - 40
	>12 y	70 - 110		25 - 30
	4-6y	70 - 110		21 - 23
	7-12y	70 - 110		19 - 21
	13-19y	55 - 90		16 - 18
PEW signs[57]	1-12m	80 - 200		20 - 60
	1-14y	80 - 180		10 - 40

Key: C-CHEWS: Cardiac Children's Hospital Early Warning Score; **PEW**: Paediatric/Pediatric Early Warning; **MPEWS**: Modified Pediatric Early Warning Score