Systematic review of paediatric track and trigger tools for identifying clinical deterioration of children in hospital: their development, validation and effectiveness

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Aims

To assess how

(1) well validated existing paediatric track and trigger tools (PTTT) &

(2) how effective paediatric early warning systems (with or without a PTTT)

are at reducing mortality and morbidity outcomes in hospitalised children.

Methods

A systematic search was carried out across several databases for studies reporting on the development, validation and effectiveness of PTTT, or broader early warning systems with or without a PTTT. Study selection, data extraction and quality assessment were conducted by two independent reviewers and disagreements resolved by discussion

Most frequent components of published Paediatric Track & Trigger Tools

Results

36 validation studies and 30 effectiveness studies were included, predominantly from North America, Australia and the UK, and were largely single-site studies conducted in specialist centres.

Outcome measures varied considerably. Validation studies were largely retrospective, case-control studies: Positive predictive value was typically low, suggesting the potential for alarm fatigue.

No studies accounted for the co-occurrence of routine clinical intervention and the longitudinal nature of the predictors in evaluating the link between high PTTT scores and subsequent deterioration.

Validation studies (n=36)			Effectiveness studies (n=30)		
	N	%		n	%
Country			Country		
United States	15	41.7	United States	18	60.0
United Kingdom	12	33.3	United Kingdom	3	10.0
Canada	2	5.5	Canada	2	6.7
Australia	0	0.0	Australia	3	10.0
Other	5	13.9	Other	3	10.0
Multiple	1	2.8	Multiple	1	3.3
Unclear	1	2.8	Unclear	0	0.0
Setting			Setting		
Specialist / tertiary	33	91.7	Specialist / tertiary	29	96.7
Non-specialist / community	0	0.0	Non-specialist / community	1	3.3
Unclear	3	8.3	Unclear	0	0.0
Single / multi-centre			Single / multi-centre		
Single-centre	35	97.2	Single-centre	28	93.3
Multi-centre	1	2.8	Multi-centre	2	6.7
Study population			Study population		
General in-patients	23	63.9	General in-patients	20	66.6
Specialist population	11	30.6	Specialist population	5	16.7
Unclear	2	5.6	Unclear	5	16.7
Study design			Study design		
Cohort	7	19.4	Uncontrolled before-after	26	86.7
Case-control	18	50.0	Controlled before-after	1	3.3
Case / chart review	10	27.8	Interrupted Time Series	2	6.7
Pilot study	1	2.8	Cluster randomised trial	1	3.3

Conclusion

There are a number of fundamental methodological limitations in the PTTT literature, and a predominance of single-site studies carried out in specialist centres limits generalisability.

With limited evidence of effectiveness, we would argue that calls to make their use mandatory across all paediatric units are not supported by the evidence base.